

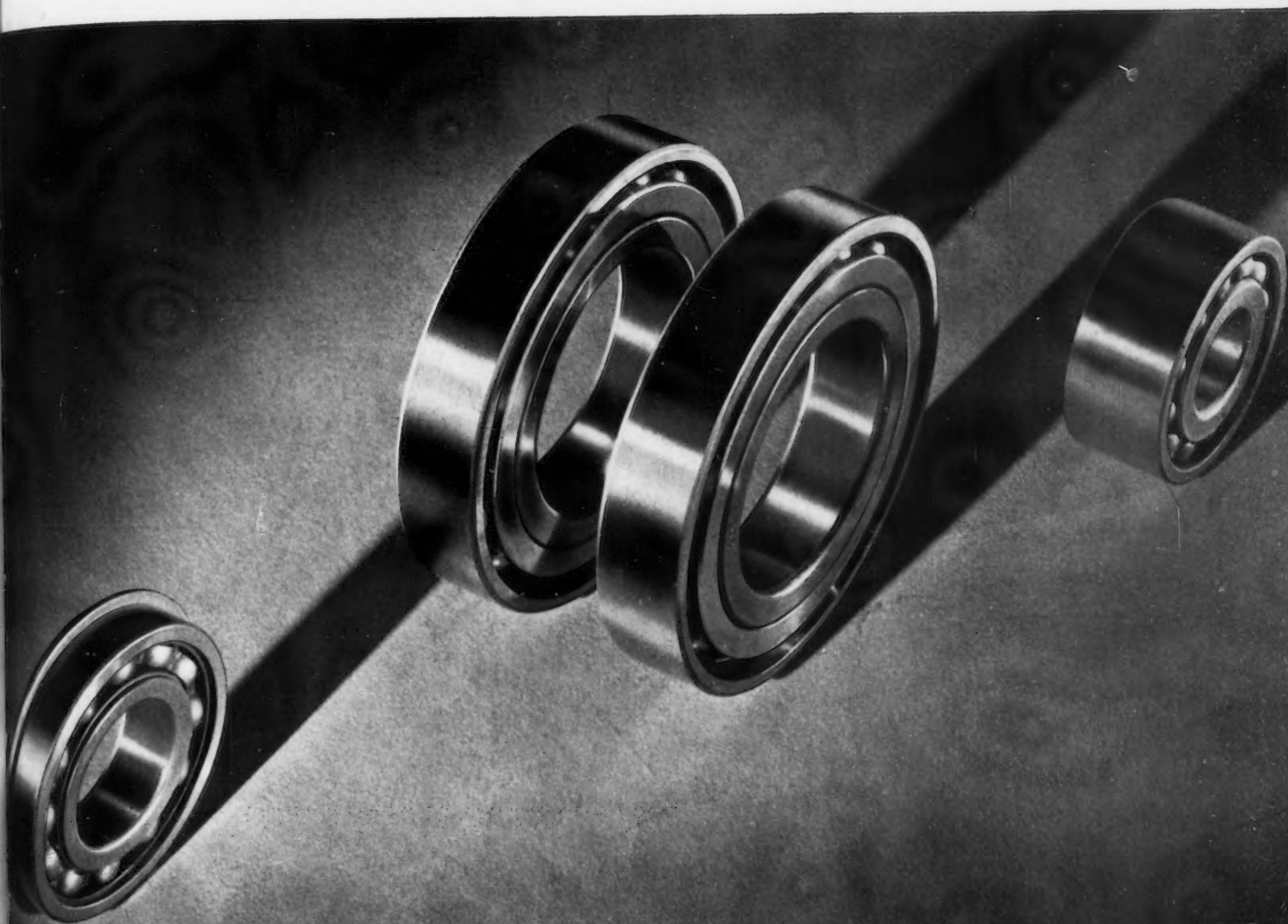
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This Week in The Iron Age

FEBRUARY 13, 1941

VOL. 147 NO. 7

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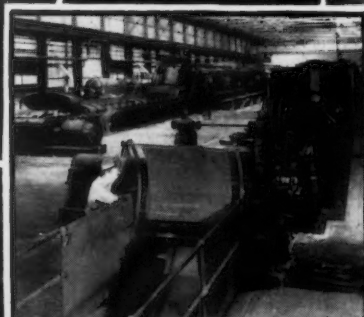
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The Iron Age

FEB. 13, 1941

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Yeast for Tomorrow's Bread

INDUSTRY is bound to keep on operating at top speed as long as the need lasts for arming to the teeth. But after that, what?

Are we getting up such speed and impetus under pressure that the momentum will keep us going thereafter, or will we find ourselves with a future WPA and relief agencies embracing half our population instead of merely 20 per cent of it?

Part of the answer to this question will be furnished by the government, but the larger part of the answer must come from industry itself, unless, of course, we are satisfied to let our government take over industry, as so many of the world's governments have done.

The "momentum" school of thought is an outgrowth of the "pump priming" idea. It has no small number of advocates and adherents. It believes that if you put enough money into circulation through government spending, no matter for what, national income will be increased to a point where the rate of activity will be self-perpetuating. And that, therefore, the raising of our national debt is in itself a factor of prosperity.

This school holds that if we raise the national debt to \$65 billion, we shall have a national income of \$100 billion, instead of a mere \$70 billion under the \$45 billion debt limit.

Of course, a cynic might ask: "Why not, if this holds true, raise the debt limit to \$130 billion and make everybody twice as prosperous with a national income of \$200 billion a year?" It would seem reasonable, would it not?

Well, we will have to boost our debt limit regardless of opinions in any school of thought, and it may increase our total national income for the time being. But it won't make us prosperous, for that would be lifting ourselves by our bootstraps, which is another name for perpetual motion. And the search for perpetual motion has broken the hearts of many inventors.

Any reasoning man, it seems to me, must realize that no matter what the outcome of the war, the world, including the United States, is coming out of it substantially poorer than it was before this epoch of destruction and non-productive effort began. And that we will be lucky to regain our former position in 10 years' time.

Taxing and spending will never be sufficient to pay the cost of war or national defense short of war. The yeast for tomorrow's bread will be found in our laboratories and experimental departments, in the form of new and better products, more efficient machines and processes, new time savings in production, not for war but for peace.

Any baker who used up all of his yeast to bake today's batch of bread would not be able to feed anyone tomorrow. National defense does not end with war preparation. It includes what is to follow.

J. H. H. H. H. H.



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Isothermal Transformation of Austenite in Gray Cast Iron

By CLINTON R. HILLIKER

*Metallurgical Assistant, Bethlehem Steel
Co., Lackawanna, N. Y.*

and

MORRIS COHEN

*Assistant Professor of Physical Metal-
lurgy, Massachusetts Institute of Tech-
nology*

IT was recently shown by E. L. Bartholomew¹ that the hardness, tensile strength, impact strength, wear resistance, and surface endurance of gray cast iron may be materially enhanced by austempering or hot quenching. R. J. Cowan² has also reported that the wear resistance and toughness of malleable cast iron may be improved by such heat treatment.

In this hot quenching process, the cast iron is first heated above the critical temperature in order to convert the matrix into austenite. The austenite, in turn, is supercooled to some temperature in the range of 500 deg. to 650 deg. F. by rapidly transferring the cast iron to a molten lead or salt bath operating at said temperature. A substantial part of the austenite is then allowed to transform isothermally over a period of time in the molten bath before the subsequent cooling to room temperature. The isothermal transformation product thus produced is bainite which is quite different in both appearance and properties from the pearlitic structures formed above 1000 deg. F. and the martensitic structures formed below 400 deg. F.

In view of this growing interest in the commercial application of the hot quenching process to cast iron, it seems appropriate at this time to report the results of an investigation carried out at M. I. T. on the isothermal transformation of austenite in gray cast iron. Two

IN VIEW of the rapidly growing interest in the commercial application of the hot quenching process to cast iron, this report on the result of experiments on the isothermal transformation of austenite in gray cast iron is particularly timely. This investigation was stimulated considerably by the practical hot quenching experience reported by E. L. Bartholomew, as reported in THE IRON AGE, Aug. 1, 1940.

cast irons of the following compositions (per cent) were studied:

	Unalloyed Cast Iron	Nickel Cast Iron
Total carbon	3.63	3.68
Graphitic carbon ..	2.92	2.56
Combined carbon ..	0.71	1.12
Silicon	1.75	1.20
Manganese	0.53	0.37
Sulphur	0.10	0.11
Phosphorus	0.56	0.28
Nickel		2.03

These irons were obtained through the courtesy of E. L. Bartholomew of the United Shoe Machinery Corp., Beverly, Mass. The nickel cast iron was very similar to the No. 53 iron used by Mr. Bartholomew in his hot quenching experiments.³

Small specimens of both irons were heated to 1550 deg. F. for 20 min., and quenched into a lead or

salt bath maintained at some predetermined subcritical temperature. The progress of the isothermal transformation of the austenite was followed by the usual methods⁴ of micro-examination and hardness testing on specimens which were removed from the hot quenching bath at suitable intervals and rapidly cooled to room temperature. By repeating this procedure for each of several hot quenching temperatures, the rate of isothermal transformation as a function of temperature was established for the two cast irons.

The results are shown graphically in Figs. 1 and 2. In each case, the curve representing the time in accordance with the usual practice, the time is plotted on a logarithmic scale] for the beginning of transformation is based principally on the examination of the microstructures; the curve for 50 per cent transformation is based principally on the hardness testing; and the curve for the end of transformation is based on both types of measurement. It should be emphasized that the designation "end of transformation" applies only to the portion of the austenite which transforms progressively until no further change can be detected. Actually, residual traces of austenite may remain untransformed long after the times indicated by the end-of-transformation curve. These persistent traces of austenite are not the concern of the present paper

and are disregarded in the following discussion.

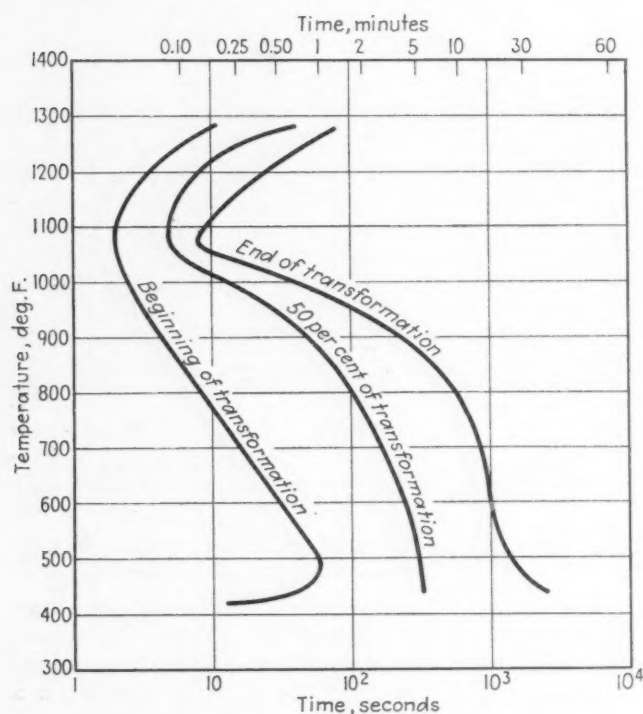
From a comparison of Figs. 1 and 2, it is clear that the nickel addition to the cast iron results in a displacement of the transformation curves toward longer times. For example, at a temperature of 1050 deg. F., which corresponds to the nose of the curves, the austenite transformation in the unalloyed iron begins in 2 sec. and is 50 per cent complete in 5 sec., while in the nickel iron the transformation begins in 6 sec. and is 50 per cent complete in 14 sec. This means that heavier sections can be successfully hot quenched if

the cast iron is alloyed with nickel. Undoubtedly, other alloying elements could also be used for this purpose.

The hardness values of the specimens at the end of transformation are plotted in Fig. 3 as a function of the transformation temperature. The curves for the two irons are similar in trend to the curve already published by Murphy, Wood and D'Amico.⁴ It is evident that the hardness does not increase progressively as the transformation temperature is lowered. The products formed in the range of 950 deg. to 850 deg. F. are slightly, but noticeably, softer

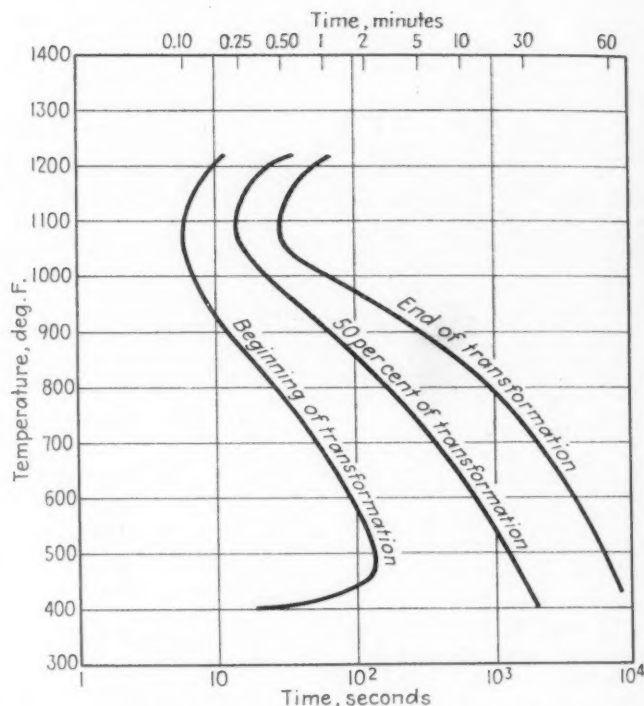
than those formed at somewhat higher or lower temperatures. E. S. Davenport⁵ has demonstrated analogous irregularities in S. A. E. steels.

For the most part, the microstructures of the isothermal transformation products are the same for the two cast irons, and resemble those found in hot quenched alloy steels. At temperatures above the nose of the transformation curves, the isothermal product is pearlite, with the lamellae becoming finer as the transformation temperature is lowered. Fig. 4b illustrates the nature of the pearlite formed at 1280 deg. F. In



ABOVE

FIG. 1—Isothermal transformation curves for unalloyed cast iron, T.C. = 3.63, C.C. = 0.71, and Si = 1.75 per cent.

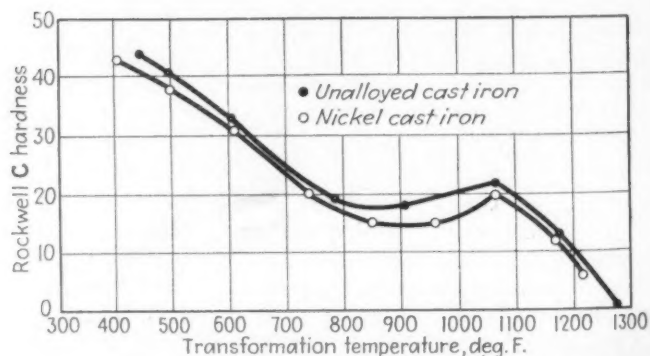


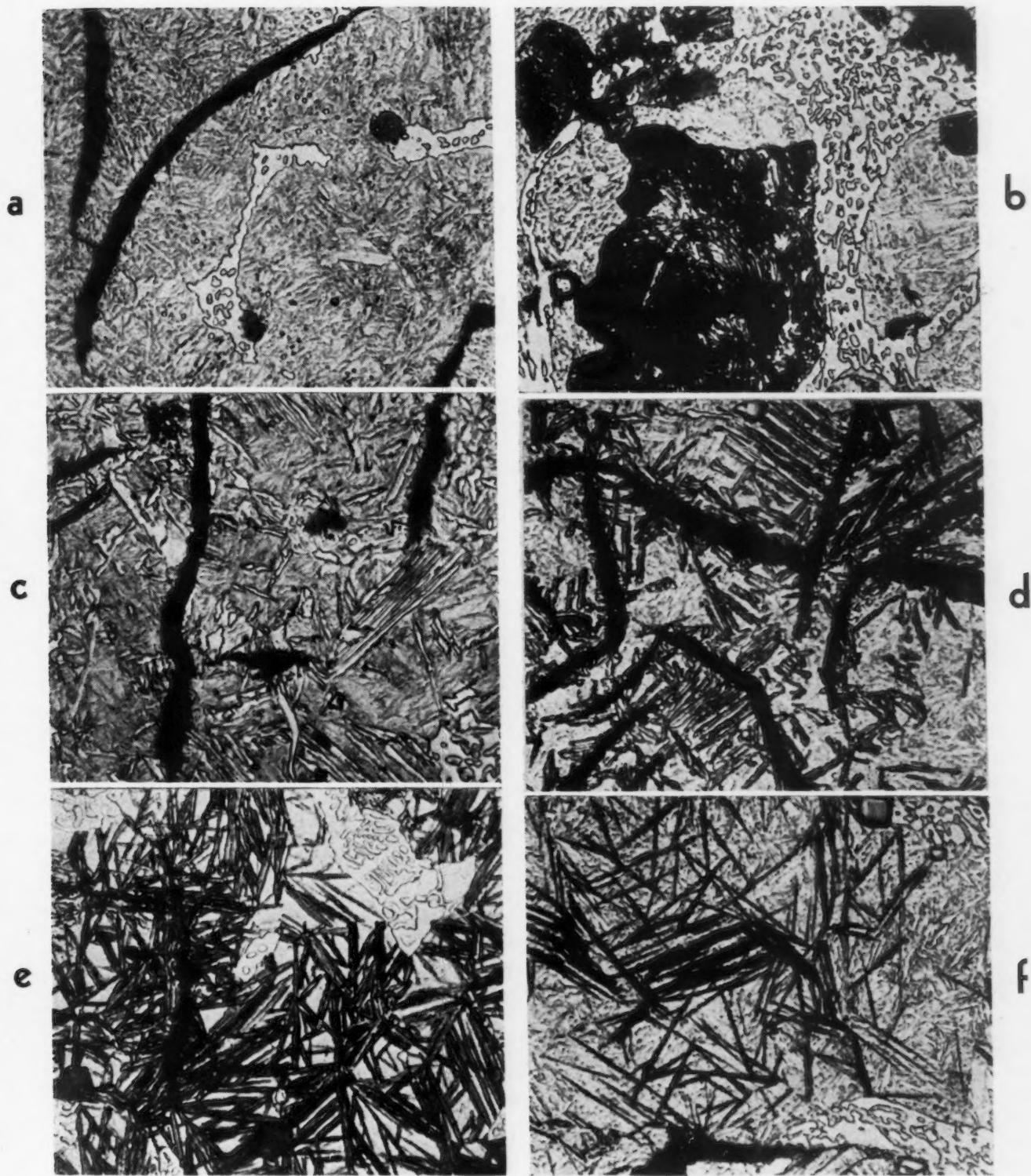
ABOVE

FIG. 2—Isothermal transformation curves for nickel cast iron. T.C. = 3.68, C.C. = 1.12, Si = 1.20, and Ni = 2.03 per cent.

RIGHT

FIG. 3—Effect of isothermal transformation temperature on the hardness of the unalloyed and nickel cast irons after virtually complete transformation.





○ ○ ○
FIG. 4—Products of transformation in unalloyed cast iron. All etched under identical conditions with nital. At 1000 diameters: (a) after direct quench to room temperature; (b) after partial transformation at 1280 deg. F.; (c) after partial transformation at 900 deg. F.; (d) after partial transformation at 750 deg. F.; (e) after partial transformation at 600 deg. F.; and (f) after partial transformation at 500 deg. F.

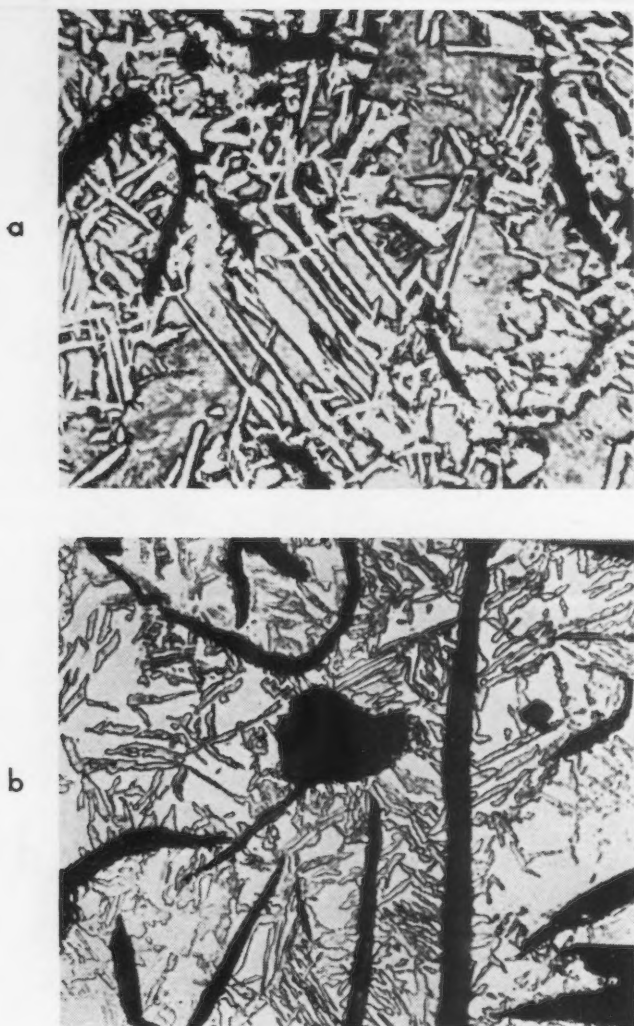


FIG. 5 — Structure after partial transformation at 900 deg. F. (Compare with Fig. 4c.); (a) etched with boiling sodium picrate — at 2000 diameters, and (b) etched with potassium bitartrate — at 1000 diameters.

this and the other photomicrographs, only partial transformation is shown in order to set the isothermal products off most clearly. The grayish background (actually light brown as viewed under the microscope) is the martensite which forms from the untransformed austenite during the rapid cooling from the hot quenching treatment to room temperature. For comparison, the martensitic structure produced by a direct quench from 1550 deg. F. is shown in Fig. 4a. The graphite flakes and phosphide eutectic contained in some of the photomicrographs are not a part of the transformation product, and hence, for the purpose of this work, no attempt was made to photograph these constituents to best advantage.

The product formed just below the nose of the transformation curves corresponds to the "acicular ferrite" found by E. S. Davenport⁵ and by H. Jolivet⁶ in alloy steels. Like ferrite, this constituent in the cast irons remains clear

white after etching with either nital (Fig. 4c) or boiling sodium picrate (Fig. 5a). Further confirmation of its ferritic nature was obtained by X-ray diffraction methods and by etching with potassium bitartrate which darkens ferrite preferentially (Fig. 5b). These findings lend considerable weight to R. F. Mehl's postulation⁷ that the "upper bainite" structures are nucleated by ferrite, unlike the pearlitic structures which are nucleated by cementite.

During the early stages of the ferrite formation, there is no simultaneous precipitation of carbides; instead the rejected carbon diffuses into the surrounding austenite. This movement of the carbon may be an important factor in the pronounced "slowing up" of the transformation at temperatures just below the nose of the curves. However, during the later stages of transformation, carbides precipitate at the advancing interface between the growing ferrite and the remaining austenite. These carbide regions are shown

blackened by sodium picrate etching in Fig. 5a. The final product of free ferrite plus carbides readily accounts for the dip in the hardness curves of Fig. 3.

With the lowering of the transformation temperature from 850 deg. to 500 deg. F., the above-mentioned ferrite constituent gradually becomes darker (even with nital etching) and more angular in appearance until it finally achieves the typical deep-etching characteristics and acicular configuration of bainite, as shown in Figs. 5d, 5e, and 5f. It is believed that these changes in the transformation product with decreasing temperature are associated with the decreasing ability of the carbon to diffuse into the surrounding austenite as the ferrite forms. Accordingly, at the lower transformation temperatures, larger amounts of carbon are momentarily trapped in solution in the ferrite, but precipitate almost immediately to form an extremely fine dispersion throughout the growing ferrite.

Summary

(1) A study has been made of the isothermal transformation of austenite at subcritical temperatures in two gray cast irons, one containing about 2 per cent nickel.

(2) Isothermal transformation curves for the two cast irons are given. As in the case of steel, nickel decreases the rate of isothermal transformation.

(3) The hardness of the isothermal products in both irons does not increase continuously with decreasing transformation temperature. The products formed between 950 deg. and 850 deg. F. are slightly, but definitely, softer than those formed on either side of this range.

(4) The microstructures of the transformation products are shown and their mode of formation briefly discussed.

References

- ¹ E. L. Bartholomew, "Gray Cast Iron—A New Treatment," *THE IRON AGE*, Aug. 1, 1940, vol. 146, No. 5, p. 52.
- ² R. J. Cowan, "The Heat Treatment of Malleable Iron," *American Foundrymen's Association*, 1940, Preprint 40-19.
- ³ E. S. Davenport and E. C. Bain, "Transformation of Austenite at Constant Subcritical Temperatures," *Trans. A.I.M.E., Iron and Steel Division*, 1930, p. 117.
- ⁴ D. W. Murphy, W. P. Wood and C. D. D'Amico, "Austenite Transformation in Gray Iron," *Trans. American Foundrymen's Association*, 1938, vol. 46, p. 563.
- ⁵ E. S. Davenport, "Isothermal Transformation in Steels," *Trans. A.S.M.*, 1939, vol. 27, No. 4, p. 837.
- ⁶ H. Jolivet, "Transformation of Austenite on Cooling: Morphology and Genesis of the Aggregates Formed," *Jl. Iron and Steel Inst.*, 1939, vol. 140, No. 2, p. 95.
- ⁷ R. F. Mehl, "The Physics of Hardenability," *A.S.M. Symposium on Hardenability of Alloy Steels*, 1938, p. 1.

THERMAL SHOCK RESISTANCE: The above test, described elsewhere as the Spalling Resistance Index Test, was devised with a view of providing a rapid and simple method of determining thermal shock resistance which is considered to be a property of a refractory material just as much as thermal expansion or conductivity. It cannot be directly correlated with spalling in service, which depends on many other factors, e.g., vitrification, but it does provide useful information regarding the risk of cracking during an initial heating up.

Two test pieces of 3x2x2 in. dimensions are sawn from the test bricks. Cutting of the test pieces with a hammer and chisel is liable to introduce serious strain and is therefore undesirable. The test pieces are inserted in a furnace of good heat capacity which has been brought to 900 deg. C. and kept steady at that temperature for some time. The test pieces are left in the furnace for 10 min. and are then taken out and placed on-end on a brick floor and allowed to cool. After 10 min. they are put back in the furnace and the cycle repeated. This process is continued until the test piece is in such a condition that, on cooling, it can be readily pulled apart in the hands. Loss of corners or small cracks are noted but failure is not considered to have occurred until the test piece breaks into two pieces of approximately equal size. The thermal shock resistance is defined as the number of reversals required to produce failure. Thanks to the shape of the test piece, fracture generally occurs in this way although the number of cycles required varies greatly with the type of brick. Certain "non-spall" bricks will undergo 30 reversals without any appreciable change, while others will crack in half immediately on placing in the furnace. Fig. 5 gives examples of the behavior of various types of material.

In certain earlier experiments on chrome-magnesite bricks it was found that materials showing excellent thermal shock resistance in service failed after about 30 reversals. Hence in general this test is only carried out to 30 reversals and any brick which survives this treatment is stated to have a thermal shock resistance of "30+".

The A.S.T.M. standards do not include any test of this type, the

Steel Plant Refractories

—and the influence of variations in quality on steel costs were described last week. Herein, in conclusion, data are given on tests to determine the properties of refractories, as for instance thermal shock resistance, slag resistance, microscopic and X-ray examination, etc.

By J. H. CHESTERS

United Steel Companies, Ltd.,
Stocksbridge, England

panel test for the resistance of refractory bricks to thermal and structural spalling (A.S.T.M. designation C38-36) being essentially a simulative test involving a preheat that may entirely alter the characteristics of the bricks and hence yield a result that bears little relation to their initial thermal shock resistance. The value of the A.S.T.M. test is obvious but as yet it has not been applied at all extensively to silica or basic bricks, and is far too expensive and prolonged for routine testing in the steelworks laboratory.

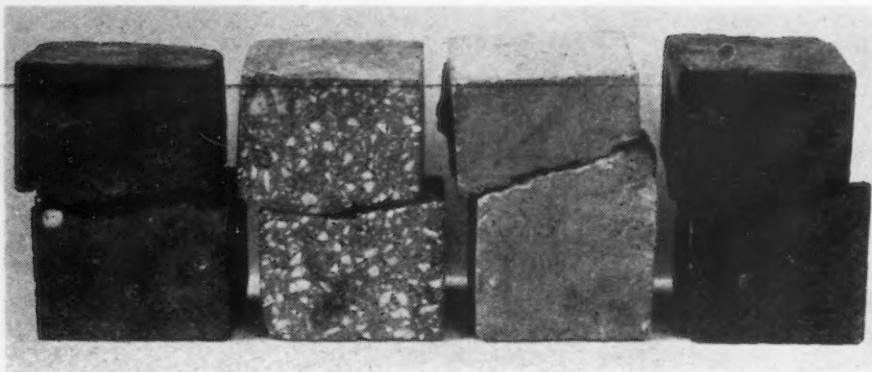
Slag Resistance

The great variation in operating conditions and the complexity of the phenomena involved make the standardization of the slag test an extremely difficult matter. The only approach to such standardization is the D.I.N. (Deutsche Industrie Normen) test for resistance to attack by solid and liquid slags at high temperatures (D.I.N. 1069).

Slag Pill Tests on Bricks: Some idea of the effect of a slag on a brick can be obtained by placing a small pill of the compressed slag on one face of the brick and sub-

jecting it to a heating schedule similar to that experienced in service. The results obtained are frequently difficult to interpret, particularly as part of the slag may run over the edge of the brick and hence not take part in the reaction. This latter difficulty is avoided in the D.I.N. test by drilling a hole 35 mm. deep and 44 mm. in diameter in the face of the brick and filling this with 50 gm. of finely ground slag. The test block used in the D.I.N. test has a horizontal surface of 80x80 mm. and a height of 65 mm. After a given heat treatment, the brick is allowed to cool and then sawn through, and the extent of slag penetration and cut determined. The plumbago (clay-graphite) and fireclay ladle bricks shown in Fig. 6 have been tested by a similar method and it will be seen that the marked difference in resistance to basic slag experienced in service is clearly demonstrated.

Slag-Brick Cone Melting Point Determinations: A good idea of the solubility of brick in slag at a given temperature can be obtained by making up a series of brick slag mixtures, generally in 10 per cent steps, i.e., 100-0, 90-10, etc., and



determining their melting point either in pill or cone form. Standard cones are not employed except for checking, the pill series being mounted on a brick in a gas-fired furnace and the fail points obtained by means of an optical pyrometer. Where serious reaction is expected between the pill and the brick on which it stands, a separating layer consisting of a thin sheet (0.01 mm.) of platinum is employed. The curves shown in Fig. 7 illustrate the results obtained with cupola slag (CaO 16.4 per cent, MnO 8.2, total iron (Fe) 16.1, Al_2O_3 9.4, SiO_2 43.9) and a number of different refractories.

Slag Spray Test: The third method, which has been widely used in the United States, Great Britain, and in Germany, involves the use of a gas burner into which can be fed fine ground slag. The flame from this burner impinges on a test panel and the type and extent of the wear after a given heat and slag treatment, is noted. The conditions in this test probably come closer to those of service than in any of the previous tests, but standardization is more difficult.

Induction Furnace Test: For certain purposes, e.g., the testing of slag resistance of hearth materials intended for use in contact with both metal and slag, very useful and interesting results can be obtained with a small induction furnace lined with the material to be tested. The latter can be either in the form of a fired or unfired crucible, a rammed lining or even a piece of brick with a hole drilled into the center. A given weight of metal is placed in the furnace and melted down, and a given weight of slag placed on the surface. The power input to the furnace is then kept as constant as possible, and the amount of corrosion after a given period determined. Fig. 8 illus-

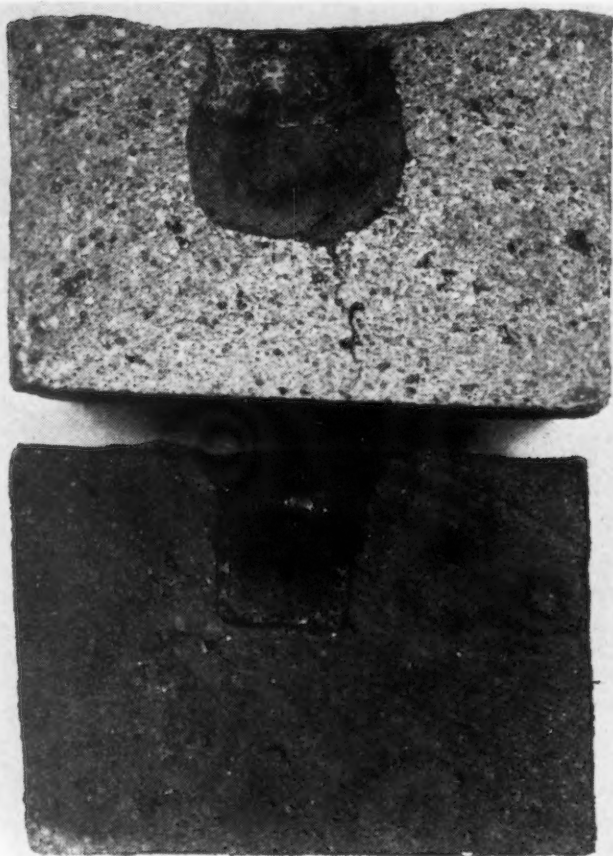
ABOVE

FIG. 5 — Thermal shock test —normal type of failure. Left to right: dolomite, silica, fireclay and chrome magnesite test pieces.

o o o

RIGHT

FIG. 6 — Slag tests on fireclay (top) and plumbago (bottom) ladle bricks. Fired for 2 hr. at 1400 deg. C. with basic slag.



trates the type of result obtained. Where new materials for use in induction furnaces are submitted for test, the use of this particular method is highly desirable, since it takes into account not only the chemical action of the slag, but also erosion due to molten metal, penetration of metal into the pores due to the absence of sufficient fine material and sintering tendency.

Microscopical Examination

Two main methods are employed in studying refractory materials under the microscope. In the first, small samples of powder are immersed in liquids of various refractive indices, and in the second thin sections are cut from the samples.

Powder Method: The sample is ground in an agate mortar until it ceases to feel gritty and a small amount is placed on a microscope slide. If the probable nature of the material is known, a liquid of approximately the same refractive index is placed on the powder and the whole covered with a thin cover glass. A study of the movement of the Becke line as the microscope objective approaches the stage from the focussed position, permits an

immediate determination whether the refractive index of the particles is greater or less than that of the liquid. Thus, by trial and error the refractive index of the particles can be determined and a valuable clue to their identity obtained. Sets of refractive index liquids varying from 1.45→1.74 in 0.01 steps are very useful for this work. Certain materials, e.g., quartz, are so characteristic in their appearance in ordinary light and under crossed nicols, that they can be identified without further tests. With other minerals, addition properties such as the birefringence and whether they are uniaxial or biaxial must be determined. The method is particularly useful in giving a quick

estimate of the amount of raw quartz in fireclay or in a fireclay brick and for the examination of such non-fabricated materials as cement, induction furnace linings, etc.

Thin Section Method: In general more can be learned from a study of a 0.001-in. thick section cut through the test brick. The technique of grinding such sections is comparatively simple, a chip from the brick being ground flat on one side with various grades of silicon carbide powder (Nos. 80, 220, 400 and 500) and then stuck on to a microscope slide with Canada balsam. The exposed surface is ground away, particular care being taken in the final stages. Since very few materials can be readily ground any thinner than 0.001 in. without coming away from the slide, the section should in general be made as thin as possible. Such sections

be obtained so readily from microscopic examination, has proved invaluable in checking up on changes in manufacturing methods. The sort of information that can be obtained by the use of the microscope can be summarized as follows:

Quartzite:

General type, crystal size, wavy or straight extinction of quartz crystals, amount of impurity present.

Silica brick:

Degree of conversion of quartz to cristobalite and tridymite (cf. Fig. 9), presence or otherwise of pre-fired silica brick grog.

Magnesite brick:

General type of magnesite employed, i.e., crypto-crystalline, e.g., Grecian, or Breunnerite, e.g., Austrian, maximum grain size, iron

oxide content, crystal size (cf. Figs. 10 and 11), cleavage, amount and distribution of silicate bond, presence of additions, e.g., chrome or alumina.

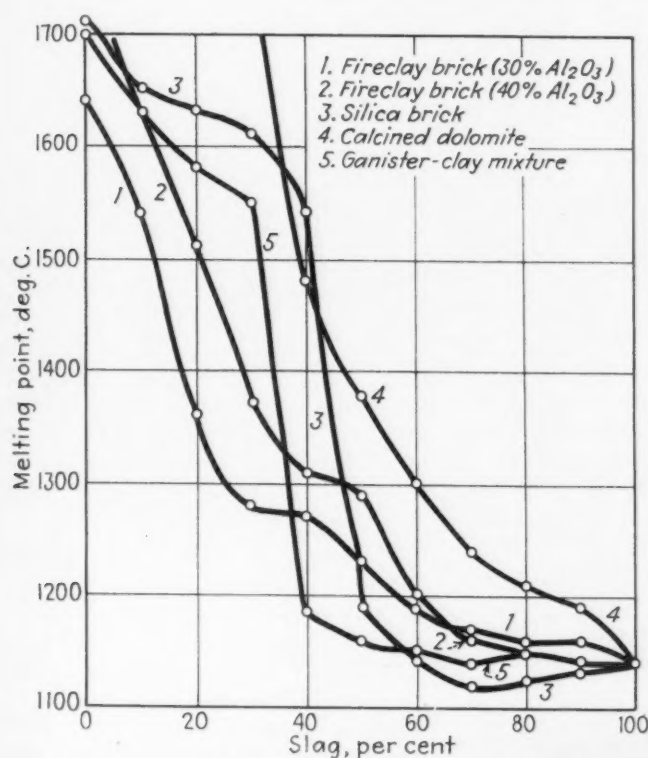
Chrome-Magnesite bricks:

Approximate chrome-magnesite ratio, type of chrome and magnesite used, (cf. Fig. 12), distribution of chrome and magnesite between coarse and fine fractions, degree of bond development.

In addition to revealing the nature of the brick as received, microscopic studies frequently explain peculiarities in the behavior of the brick in service. Thus, a thin section cut through a siliceous firebrick after slag attack may show that it behaves not as an equilibrium mixture of silica and alumina, but rather as a mixture of quartz of very high slag resistance, with fireclay of comparatively low slag resistance. Such information might for example suggest the possibility of using silica bricks or firestone instead of fireclay brick with a view of obtaining higher slag resistance. Similarly with magnesite it may be seen that the attack on Grecian magnesite proceeds only at the surface, whereas with Austrian magnesite the individual crystal units become separated and float away into the slag. Such an observation led to the addition of Grecian magnesite to induction furnace linings, and a consequent increase in lining life.

X-ray Examination

In general, X-ray examination is used as a check on the findings of the microscope, but its possibilities are so great that the procedure might be advantageously reversed. Thus, casual microscopic examination of an ordinary firebrick does not reveal the presence of mullite unless the brick has been fired at



LEFT
FIG. 7—Melting point curves of various refractory material—cupola slag mixtures.

BELOW
FIG. 8—Induction furnace slag tests. Left to right — fireclay, sillimanite, clay-graphite (used and unused) after testing by melting bar iron with a hematite addition to form a slag.



not only enable a lot to be learned regarding the texture and constitution of a refractory but also provide a very useful record for subsequent comparison. Thus a chrome-magnesite brick whose thermal shock resistance has fallen off may be found in thin sections to have a very different constitution to that of the original supply, e.g., the magnesite may be present as comparatively coarse material instead of entirely in the fine section. Information of this type, which can

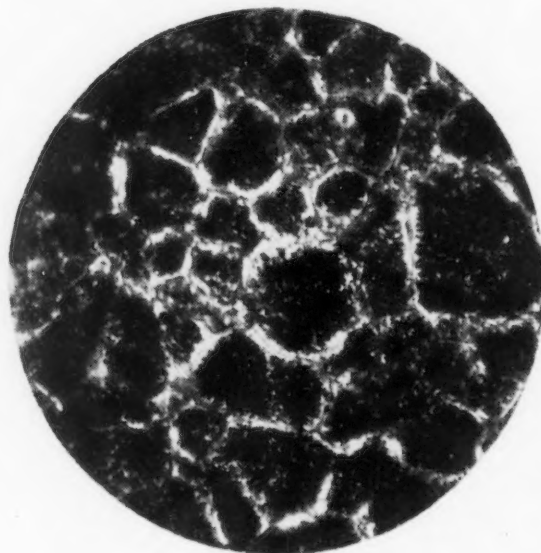


LEFT
FIG. 9—Twinned crystal of tridymite in hard fired silica brick. Crossed nicols x 1000.

a very high temperature. X-ray examination on the other hand not only shows the presence of mullite in almost all firebricks, but also reveals the amount of cristobalite and quartz present. With very soft fired bricks, e.g., rod covers, γ alumina may also be found. So remarkable indeed is the variation of these constituents with the firing temperature that starting with standards of siliceous and aluminous clay fired at known temperatures, it has been found possible to estimate the firing temperature of most casting pit refractories within approximately 50 deg. C. This technique alone has more than justified the use of X-ray examination since it frequently enables peculiarities in the behavior of casting pit refractories to be explained that could not at present be explained by any other method. Thus, in a recent and very serious accident with mold top bricks, it was shown that the firing temperature had increased from 1250 deg. C. to 1400 deg. C. resulting in serious loss of thermal shock resistance. The overfiring revealed by X-ray examination was subsequently admitted by the manufacturer.

Constitution: Debye-Scherrer spectra obtained with the better known refractories are shown in Fig. 13. It will be seen that they are beautifully simple compared with optical spectra and enable a ready differentiation to be made. Thus cristobalite and tridymite, which are frequently confused under the microscope, give very different spectra, while the reaction products of magnesia and alumina, i.e., spinel, and of magnesia and silica, i.e., forsterite, are quite dif-

RIGHT
FIG. 10—Austrian magnesite showing periclase crystals with magnesioferrite inclusions. Ordinary light x 100.



ferent from the constituent materials. The X-ray method can therefore be used to follow such reactions by the disappearance of the original constituents and the gradual appearance of the new phase. The technique also reveals similarities, e.g., between magnesium aluminate and chromite, which show that they belong to the same crystallographic group, and thus may be expected to form solid solutions with one another. An example of this phenomena is the solution of magnetite in chromite that is responsible for the bursting of chrome-magnesite bricks in open hearth furnaces.

With certain bricks, e.g., stabilized dolomite, X-ray examination provides the only quick and satisfactory method of determining constitution. It should, however, be pointed out that the method has one limitation not possessed by the microscope, namely, that the presence of less than 5 per cent of an impurity may remain unnoticed since the intensity of its lines in the spectra are insufficient to per-

mit of identification. Furthermore, relatively little information can be obtained with glassy materials.

Crystal Size: The use of the monochromatic pinhole method (modified Laue method) is invaluable in the study of basic refractories. It provides a ready method of determining the crystallinity of dead burned magnesite which in certain cases, e.g., with Grecian magnesite, is difficult if not impossible under the microscope. With chrome ores monochromatic pinhole photographs are interesting since

they are peculiarly characteristic of the place of origin. Thus, ores from Greece show a very coarsely crystalline structure, while those from certain other sources give an almost "amorphous" pattern.

With quartzites the results in the main confirm the microscopic observations, but they show in addition that certain large crystals are badly strained, or alternatively can be considered as consisting of a large number of very small crystals arranged at slightly different orientations. This observation explains why some of the apparently coarsely crystalline quartzites show remarkably high inversion rates.

The foregoing discussion of test methods contains one obvious omission, viz., chemical analysis. For this the reader is referred to the A.S.T.M. Standard Methods (designation C18-37T) and to other specialized articles on the subject.

The methods of testing cements, induction furnace linings and other unfabricated materials, which constitute an important part of the

work of a refractories section will be dealt with later, e.g., in connection with the lining in induction furnaces.

Acknowledgment

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Bibliography on Testing

General:

- "Refractories," by F. H. Norton, McGraw-Hill Book Co., Inc., 1931.
Manual of A.S.T.M. Standards on Refractory Materials, 1937.
Institution of Gas Engineers, publication No. 94, 1934, "Standard Specifications for Refractory Materials for Gas Works."
Deutsche Industrie Normen, "Prüfverfahren für feuerfest Baustoffe."
"Ceramics (Clay Technology)," by H. Wilson, McGraw-Hill Book Co., Inc., 1927.
"Thin Section Mineralogy," by A. F.

- Roberts, K. M., and H. Oliver, Trans. Ceram. Soc., 1936, 35, 337.
Robitschek, J., Tonind. Ztg., 1927, 51, 907.
Swallow, H. T. S., Trans. Ceram. Soc., 1937, 36, 384.
Washburn, E. W., J. Am. Ceram. Soc., 1921, 4, 917.
Westman, A. E. R., *ibid*, 1926, 9, 311.

True Specific Gravity:

- Hugill, W., and W. J. Rees, Trans. Ceram. Soc., 1925, 24, 70.
Kühn, E., Feuerfest, 1929, 5, 5.

Permeability:

- Bansen, H., Stahl u. Eisen, 1928, 48, 973.
Bartsch, O., Ber. deut. keram. Ges., 1933, 14, 471; *ibid*, 1933, 14, 519.
Bremont, P., Trans. Ceram. Soc., 1935, 34, 287.
Clews, F. H., and A. T. Green, *ibid*, 1933, 32, 295; 1933, 32, 319; 1934, 33, 21; 1934, 33, 57; 1934, 33, 479.
Ketchum, P. W., A. E. R. Westman and R. K. Hursh, Univ. Ill. Eng. Exp. Sta. Circ. No. 14, Vol. 23, 50, 1926.
Lynam, T. R., and W. J. Rees, Ref. Matls. Joint Sub. Comm. Inst. Gas. Eng. Rept. No. 78, p. 31, 1933.
Vickers, A. E. J., J. Soc. Glass. Tech., 1933, 17, (66), 93.
Wickersham, F. A., Blast Fee. Stl. Plnt., 1927, 15, 339.
Wickersham, F. A., J. Am. Iron and Steel Inst., 1927, 116, 481 A.

After-Contraction:

- Booze, M. C., Ref. J. 1928, 3, 687.
Dodd, A. E., Trans. Ceram. Soc., 1937, 36, 466; *ibid*, 1937, 36, 473.
Geller, R. F., and E. N. Bunting, J. Res. Nat. Bur. Sta., 1940, 25, 15.
Phelps, S. M., J. Am. Ceram. Soc., 1926, 9, 659.
Rees, W. J., Trans. Ceram. Soc., 1924, 24, 66.
Rhead, T. F. E., and R. E. Jefferson, Gas J., 1925, 171, 31.
Steger, W., Ber. deut. keram. Ges., 1938, 19, 2.
Vickers, A. E. J., and J. A. Sugden, J. Soc. Glass. Tech., 1933, 17, 320.

Pyrometric Cone Equivalent:

- Bartsch, O., Ber. deut. keram. Ges., 1926, 7, 121.
Clews, F. H., and A. T. Green, Trans. Ceram. Soc., 1935, 34, 467.
Cole, S. S., J. Am. Ceram. Soc., 1927, 10, 180.
Phelps, S. M., Am. Refractories Inst. Bull., 17, 1927.
Schauer, T., Sprechsaal, 1939, 72, 378.
Stott, V. H., Trans. Ceram. Soc., 1939, 38, 341.
Vickers, A. E. J., and L. S. Theobald, Trans. Ceram. Soc., 1924, 24, 86.

Refractoriness Under Load:

- Booze, M. C., Am. Refractories Inst. Tech. Paper No. 2, 1926.
Bremont, P., Ceramique, 1937, 40, 1, 21, 41, 61.
Caesar, F., Ber. deut. keram. Ges., 1936, 17, 370.
Clews, F. H., and A. T. Green, Trans. Ceram. Soc., 1935, 34, 467.
Dale, A. J., Trans. Ceram. Soc., 1933, 23, 217; 1924, 24, 170; 1924, 24, 199; 1924, 24, 216; 1926, 26, 138; 1927, 27, 23.
Dodd, A. E., *ibid*, 1938, 37, 436; 1938, 37, 427.
Hirsch, H., Keram. Rundschau, 1925, 33, 279; Stahl u. Eisen, 1926, 47, 1717; Ber. deut. keram. Ges., 1928, 9, 577.
Long, B., Ceramique, 1935, 38, 571, 219; 1937, 40, 597, 205.
Mellor, J. W., and B. F. Moore, Trans. Ceram. Soc., 1915, 15, 117; 1917, 17, 360.
Norton, F. H., J. Am. Ceram. Soc., 1939, 22, 334.
Petit, D., Trans. Ceram. Soc., 1939, 38, 313.

Thermal Shock Resistance:

- Bennie, H. D., Trans. Ceram. Soc., 1937, 36, 395.



LEFT
FIG. 11—Electrically fused magnesia showing cubic cleavage. Ordinary light x 60.

Rogers and P. F. Kerr. McGraw-Hill Book Co., Inc., 1933.

"The Microscopic Determination of the Nonopaque Minerals," by E. H. Larsen and H. Berman; Government Printing Office, Washington, 1934.

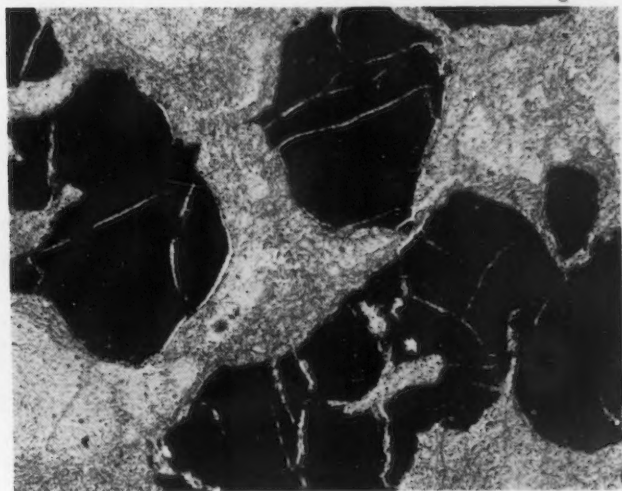
"Elements of Optical Mineralogy," Parts I, II and III, by A. N. Winchell, John Wiley & Sons, Inc., 1931.

"Applied X-rays," by G. L. Clark, McGraw-Hill Book Co., Inc., 1932.

Porosity:

- Goodner, E. F., J. Am. Ceram. Soc., 1921, 4, 288.
Hartmann, M. L., O. B. Westmont and S. F. Morgan, *ibid*, 1926, 9, 298.
Macey, H. H., and F. H. Clews, Trans. Ceram. Soc., 1940, 39, 279.
Pressler, E. E., J. Am. Ceram. Soc., 1924, 7, 447.

RIGHT
FIG. 12—Chromite high in gangue material (serpentine). Ordinary light x 40.



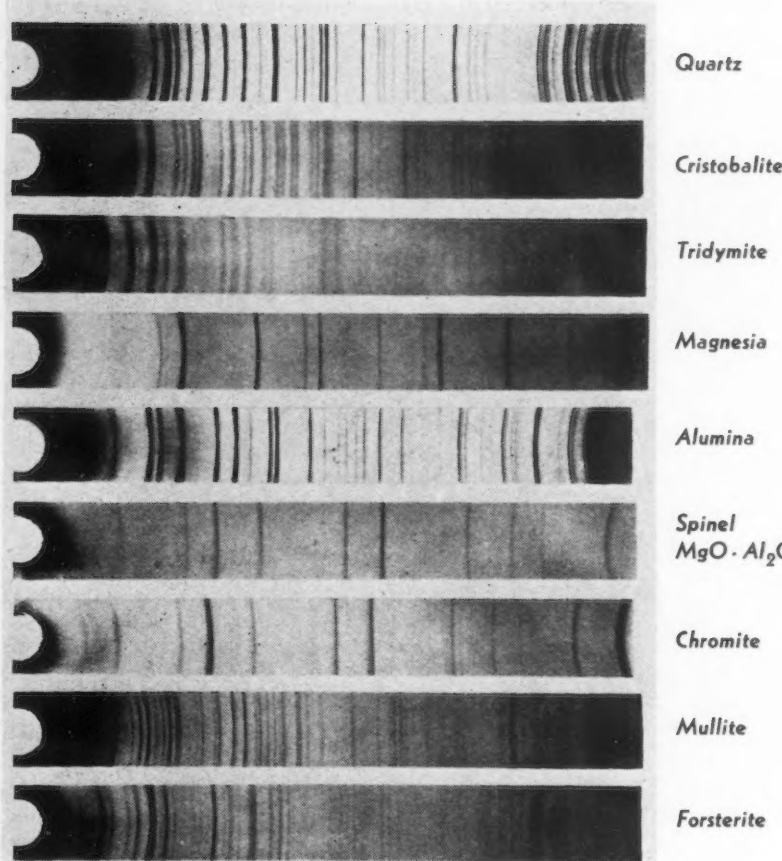


Fig. 13—Debye Scherrer photographs of typical refractory materials.

Chesters, J. H., and L. Lee, *ibid.*, 1937, 36, 294.

Endell, K., *Glastech. Ber.*, 1933, 11, 178.

Endell, K., and W. Steger, *ibid.*, 1926, 4, 43.

Green, A. T., and A. J. Dale, *Trans. Ceram. Soc.*, 1925, 25, 428.

Green, A. T., and H. Edwards, *ibid.*, 1926, 26, 185.

Harvey, F. A., *Am. Ref. Inst. Tech. Bull. No. 42*, Sept., 1933.

Heindl, R. A., *ibid.*, No. 58, May, 1935.

Hyslop, J. F., *Trans. Ceram. Soc.*, 1939, 38, 304.

McKinley, J. M., and S. M. Phelps, *J. Am. Ceram. Soc.*, 1939, 22, 83.

Norton, F. H., *ibid.*, 1926, 9, 446; 1933, 16, 422.

Phelps, Swain and Ferguson, *ibid.*, 1931, 14, 389.

Phelps, S. M., *Penn. State Coll. Min. Ind. Exp. Sta. Bull.*, 1934, No. 14, 457; *Am. Refs. Inst. Tech. Bull.*, 1, 1926; *ibid.*, 24, 1928.

Preston, F. W., *J. Am. Ceram. Soc.*, 1926, 9, 654.

Preston, F. W., *ibid.*, 1933, 16, 131.

Preston, F. W., and H. E. White, *ibid.*, 1934, 17, 137.

Steger, W., *Stahl u. Eisen*, 1925, 45, 249.

Winkelmann, A., *Ann. Phys. und. Chem.*, 1894, 51, 730.

Slag Resistance:

Bartsch, O., *Ber. deut. keram. Ges.*, 1933, 14, 471 and 519; 1934, 15, 281; 1938, 19, 413.

Chesters, J. H., and L. Lee, *Trans. Ceram. Soc.*, 1936, 35, 271.

Dale, A. J., *Trans. Ceram. Soc.*, 1925, 25, 326.

Dodd, A. E., *ibid.*, 1937, 36, 63.

Endell, K., R. Fehling and R. Kley, *J. Am. Ceram. Soc.*, 1939, 22, 105.

Endell, K., and G. Brinkmann, *Stahl. u. Eisen*, 1939, 59, 1319.

Endell, K., *Ber. deut. keram. Ges.*, 1938, 19, 491.

Ferguson, R. F., *J. Am. Ceram. Soc.*, 1928, 11, 90.

Fettke, C. R., and W. E. Stewart, *Carnegie Inst. Tech. Coop. Bull., Mining and Met. Invest. No. 73*, 1936.

Fromm, F., *Ber. deut. keram. Ges.*, 1934, 15, 49.

Hartmann, F., *Stahl u. Eisen*, 1933, 53, 934; 1927, 47, 182; *Ber. deut. keram. Ges.*, 1928, 19, 1.

Herty, C. H., Jr., F. A. Hartgen and G. T. Jones, *Mining Met. Invest. Bur. Mines, Carnegie Inst. Tech. Mining, Met. Adv. Board Coop. Bull.*, 1931, 56.

Howe, Phelps and Ferguson, *J. Am. Ceram. Soc.*, 1923, 6, 589.

Howe, R. M., *ibid.*, 1923, 6, 466.

Howe, R. M., *Am. Soc. Testing Mats.*, 1923, 6, 269.

Hugill, W., and A. T. Green, *Ref. Matls. Joint Comm., 28th and 29th Repts. Inst. Gas. Eng.*, 1937, 44, and 1938, 29.

Hursh, R. K., and C. E. Grigsby, *Univ. Illinois Bull., Circ. 17*, 1928.

Hursh, R. K., *J. Am. Ceram. Soc.*, 1939, 22, 354.

Hyslop, J. F., *J. Soc. Glass. Tech.*, 1936, 20, 61.

Hyslop, J. F., and H. C. Biggs, *Trans. Ceram. Soc.*, 1932, 31, 173.

Kraner, H. M., *Metals and Alloys*, 1938, 9, 79.

McDowell, S. J., *Blast Fee. Stl. Plant*, 1927, 15, 286.

Norton, F. H., *J. Am. Ceram. Soc.*, 1924, 7, 599.

Salmang, H., *Stahl u. Eisen*, 1927, 47, 1816.

Salmang, H., and J. Kaltenbach, *Feuerfest.*, 1931, 7, 161.

Salmang, H., and M. Planz, *Arch. Eisenhüttenwesen*, 1933, 6, 341.

Schurecht, H. G., *J. Am. Ceram. Soc.*, 1939, 22, 116; 1939, 22, 334.

Scott, A., *Trans. Ceram. Soc.*, 1925, 25, 339.

Vickers, A. E. J., and R. A. Bell, *J. Soc. Glass. Tech.*, 1935, 19, 151.

Microscopic Examination:

Bossaza, V. L., *Trans. Ceram. Soc.*, 1938, 37, 1.

Chesters, J. H., *Ref. J.*, 1935, 11, 180.

Curtis, T. S., *J. Am. Ceram. Soc.*, 1928, 11, 609; 1928, 11, 904.

Hibsch, J. E., *Feuerfest.*, 1926, 2, 93 and 113.

Keyes, M. G., *Am. J. Sci.*, 1925, 10, 538.

McCaughy, W. J., *Trans. Am. Ceram. Soc.*, 1913, 15, 322.

Peck, A. B., *Am. Ceram. Soc. Bull.*, 1927, 6, 297.

Rees, W. J., *Trans. Faraday Soc.*, 1925, 21, 293.

Ross, C. S., *Am. J. Sci.*, 1924, 7, 483.

Scott, A., *Trans. Ceram. Soc.*, 1918, 17, 475.

Sullivan, J. D., *U. S. Bur. Mines Tech. Paper 381*, 26 pp., 1927.

Weyl, W., *Tonind. Ztg.*, 1929, 53, 559.

X-Ray Examination:

Bragg, Wm. H., *Engineer*, 1927, 144, 3748.

Büssem, W., *Keram. Rundschau.*, 1935, 4 (17), 196.

Chesters, J. H., G. L. Clark and K. C. Lyon, *Trans. Ceram. Soc.*, 1935, 34, 243.

Clark, G. L., and H. V. Anderson, *J. Ind. Eng. Chem.*, 1929, 21, 781.

Gottfried, C., *Ber. deut. keram. Ges.*, 1928, 9, 445.

Harvey, F. A., and R. E. Birch, *J. Am. Ceram. Soc.*, 1936, 19, 322.

Jay, A. H., and J. H. Chesters, *Trans. Ceram. Soc.*, 1938, 37, 209.

Jay, A. H., *ibid.*, 1939, 38, 455.

McVay, T. N., and C. L. Thompson, *Pottery Gaz.*, 1929, 54, 295.

Mehmel, M., *Ber. deut. keram. Ges.*, 1938, 19, 295.

Nagelschmidt, G., *Z. Kristall.*, 1934, 87, 120; 1937, 97, 514; 1937, 98, 31.

Nahmias, M. E., and G. Hagg, *ibid.*, 1934, 88, 90.

Nahmias, M. E., *ibid.*, 1932, 83, 329 and 1933, 85, 355.

Rinne, F., *Keram. Rundschau.*, 1925, 33, 427, 459 and 525.

Rooksby, H. P., and J. H. Partridge, *J. Soc. Glass. Tech.*, 1939, 23, 338.

Rooksby, H. P., *J. Roy. Soc. Arts*, 1940, 88 (4552), 308.

Taylor, N. W., *Metals and Alloys*, 1932, 3 (8), 240.

Taylor, W. H., *J. Soc. Glass. Tech.*, 1932, 16, 111.

Taylor, W. H., and W. W. Jackson, *Proc. Roy. Soc. (London)*, 1928, 119, 132.

Westman, A. E. R., *Univ. Ill. Eng. Exp. Sta. Bull.*, 1929, No. 193.

Wyckoff, R. W. G., J. W. Grieg and N. L. Bowen, *Am. J. Sci.*, 1926, 11, 459.

Zwetsch, A., *Ber. deut. keram. Ges.*, 1934, 15, 2.

Follansbee Modernizes Production Facilities

By T. C. CAMPBELL
Pittsburgh Editor, The Iron Age

*New Equipment Re-establishes Company
as a Maker of Specialty Steels*

FOLLOWING a six-year period of reorganization which required almost herculean efforts and a tenacity strongly reminiscent of the pioneering spirit which formed the Follansbee Brothers Co. in 1894, the new company now known as the Follansbee Steel Corp. was formed in 1940.

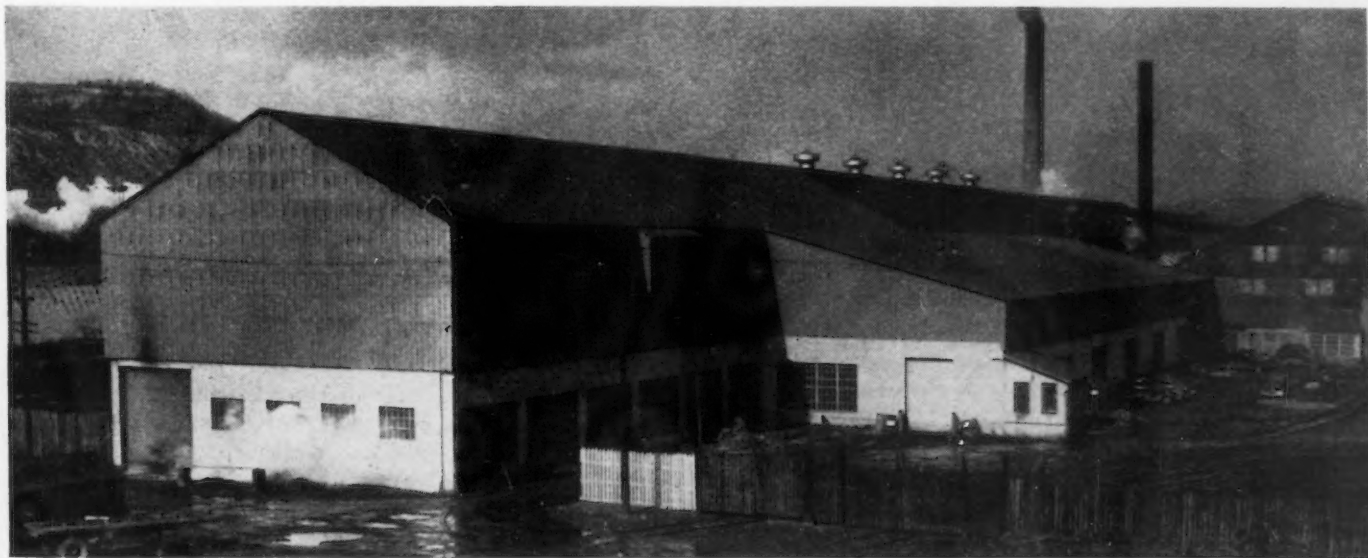
This company, in addition to taking over the assets of the predecessor company, started major operations this year with new equipment which will enable it to maintain its competitive position in the tin plate and sheet field

where modernization has played such a large part in the past several years.

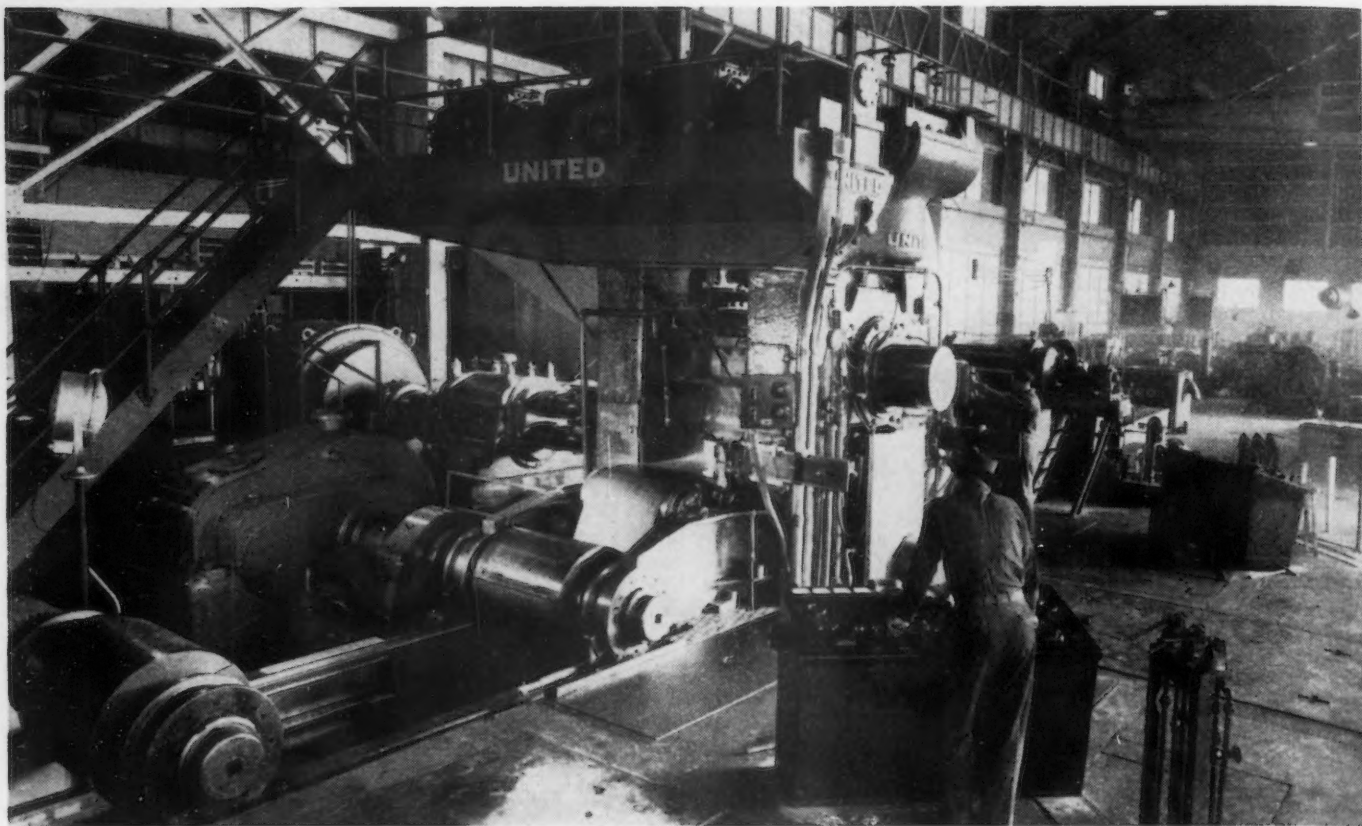
The installation of modernized equipment and technique by Follansbee is another milepost in the fight of small steel producers to stay in the parade despite a more difficult competitive situation, as

well as to meet more strict consumer requirements.

It is also significant that Follansbee, as has been the case with some other small concerns, has elected to remain principally a maker of specialty steels rather than a producer on a tonnage basis. A favorable factor in this connection is the



SOUTH end of the Follansbee plant, showing two of three buildings reconstructed to house the new mill equipment.



ONE of the two new 34-in. wide reversing cold reducing mills at the Fallansbee plant of Fallansbee Steel Corp. The mill has just been reversed and is ready for the next pass.

New Equipment—Follansbee Steel Corp.

Two four-high cold reversing mills

Remarks

12½ in. and 37 x 34 in. united mills will reduce strip 31 in. wide to tin plate and sheet gages at 942 to 1570 ft. per min. Served by 2200 hp. m.g. set.

One four-high temper mill

18 in. and 49 x 42 in. united mill will temper roll strip of tin plate and sheet gages up to 36 in. wide at 1410 to 2350 ft. per min. Has individually driven entry and delivery roll tension units. Served by 1500 hp. m.g. set.

Two cutting and shearing lines

Consist of feed roll, pinch rolls, slitter, leveler, flying shears and piler. One line will have reciprocal shears and conveyor in addition to above.

Two bell type gas-fired annealing furnaces

To be completed soon. Designed by Follansbee men, these have unusual ability to heat different-sized piles and sizes of coils

simultaneously. Individual dampers and flues over each coil stack make it possible to bring up temperature of each stack at same rate. All piles also subject to general flue control. Additional units to be built in the future.

Electric power facilities

6000 kw. bank of transformers has doubled old capacity.

Finished Steel Products

Cold reduced tin plate
Cold reduced black plate
Cold reduced sheets
Seamless terne roofing
Long terne plate
Electrical (high Si) sheets
Charcoal tin plate
Terne plate (hand mill)

company's ownership of the Sheet Metal Specialty Co. This subsidiary, established in 1906 manufactures primarily stove pipe, milk cans, other dairy ware items and a variety of stampings.

The Follansbee Brothers Co. was organized in 1894, and in 1902 purchased 250 acres of farmland at the location now known as Follansbee, W. Va. An interesting sidelight is the fact that on the first day on which various plots of ground were placed on sale for housing sites, all available lots on Main Street were purchased. By 1904 the company, which previously had done a warehouse business in tin plate and sheet steel, became a manufacturer of these products, having installed a rolling mill with auxiliary finishing and tinning equipment.

From time to time a number of additions were made at the Follansbee, W. Va. plant, and in 1922 an open hearth steel works and rolling mill for hot rolled sheet production was constructed at Toronto, Ohio, nine miles distant.

An important feature of the Follansbee reorganization was a sub-

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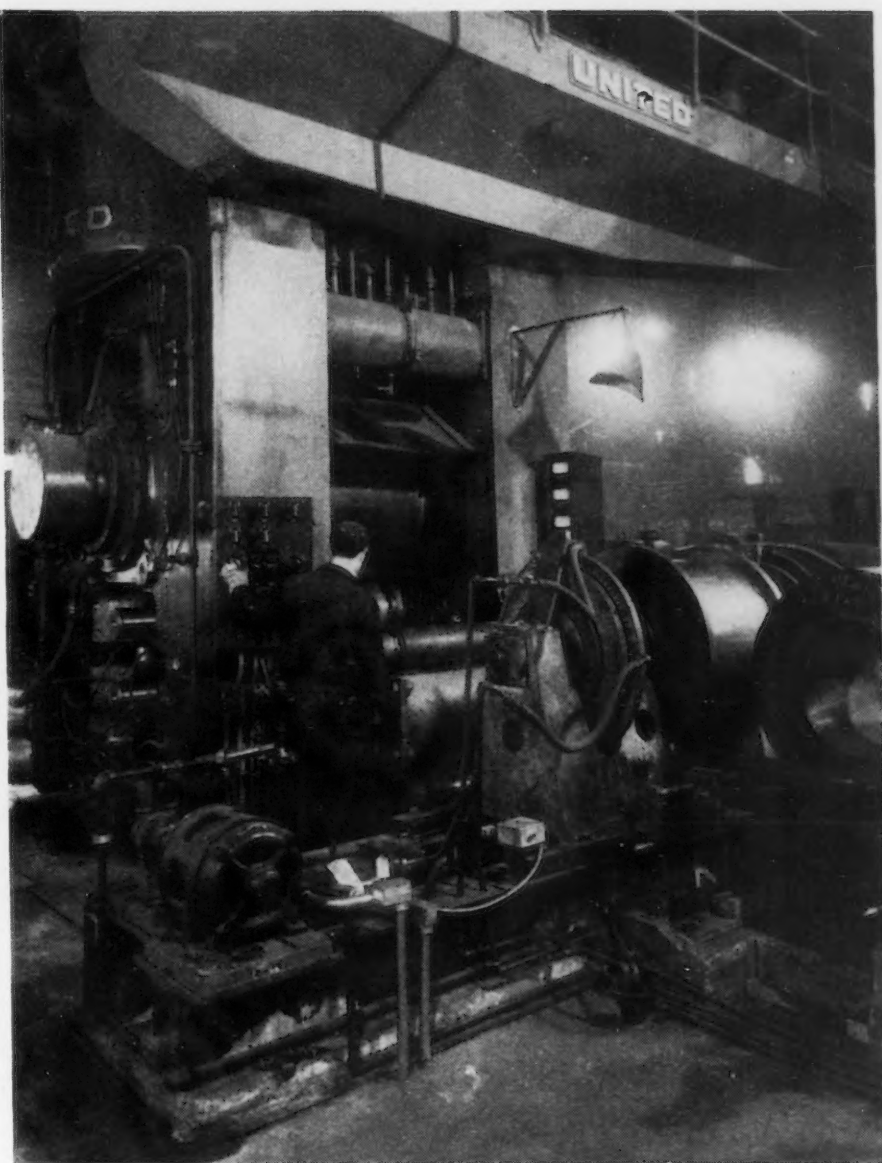
ENTRY side of the new
43-in. wide temper mill
at Follansbee.

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stantial modernization program to permit the cold reduction of various tin plate and sheet items in order to meet the general trend in this direction. The major part of \$1,-270,000 devoted to such modernization was earmarked for two new cold reducing mills, a new temper mill, and auxiliary equipment at the Follansbee plant. Details on this new equipment are shown in the table on opposite page.

Prior to the expansion program, the open-hearth equipment at Follansbee, W. Va., was abandoned, providing room for the cold reduction mills and other equipment. A large proportion of the company's products are and will be cold reduced and processed from purchased hot rolled strip, delivered under a long term contract. This condition was part of the reorganization program and enabled the company to reduce the amount of money necessary in order to emerge from the trusteeship.

Steel from the company's Toronto open hearths is available for the production of electrical sheets, a specialty item with the company for a great many years, as well as for two other specialties, hand mill charcoals and hand mill ternes. The remainder of the steel produced at the Toronto works is available for the production of car-



bon forging billets which the company is selling in 4x4 in. to 10x10 in. sizes.

An interesting feature in the Follansbee setup are specially constructed tinning lines, including patented processing equipment for coating long terne sheets and seamless roll roofing, the latter being a recent Follansbee development.

A complete list of the principal products of Follansbee and the capacity for each, taking into consideration equipment now in use or under construction, is indicated in Table II. Cold reducing facilities include not only the new mills indicated elsewhere but also a 38 in. mill installed in 1933 and modernized in 1939.

Exploiting Our Mangan e

—Last week B. W. Corrado summed up our manganese situation, and pointed out that a number of processes have been devised to tap large low-grade ore reserves. Herein, one very promising low-grade ore recovery process is described in detail.

COST of ferromanganese used in steel production has increased over a term of years relatively faster than the average of the other elements of cost. The World production and use of manganese ore has also expanded considerably faster than the production and use of iron ore over the years, and it is reasonable to expect a continuation of this trend.

The reserves of manganese ore in the United States, of other than the so-called "high grades," have been estimated to be so great as to outlast the Nation's reserves of iron ore. This, however, is on the basis of using manganese ores with quite low manganese content, for example with 25 per cent of manganese instead of 50 per cent, and including ore of even lower grade such as the South Dakota spathic manganese ore with about 16 per cent each of manganese and iron.

These grades have not been considered for production of ferromanganese as they are quite impracticable for use in ferromanganese blast furnaces, as operated now and for many years past.

An actual and disastrous shortage of the accustomed "high grade" manganese ore supplies in the United States has always been recognized as a possibility, and has lately been a matter of real concern from a defense standpoint. This problem is not as serious, however, as it has been painted, because it has always been assumed at the same time that the regular practice of ferromanganese smelters is the only possible method and any such assumption

is and has been wide of any reasonableness.

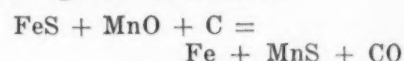
And from what can be taken as a long-range viewpoint the "manganese problem" is quite a good deal broader in fact, because manganese is a relatively abundant metal and has special and valuable metallurgical properties worth more of the metallurgist's attention. And, also, any offsetting possibilities to restrain, if not to reduce rising steel-making costs is a real problem in the National economy. Meanwhile the use of larger amounts of purer manganese in steel and other high alloys is relatively little developed.

The Bureau of Mines is now doing much development work in manganese and is understood to have available \$2,000,000 or so for manganese investigations, and it is understood that these investigations are to cover both mining and metallurgy. A Report of Investigations, No. 3545, by Messrs. C. E. Wood, E. P. Bassett and P. R. Porath of the Bureau is just out. The report studies the recovery of

authors refer to U. S. Patent, No. 1,703,657, Feb. 26, 1929, to Anson G. Betts in which the process is more fully described from a chemical standpoint.

The investigators tested the process by smelting together in crucibles, the manganese-iron ore, varying additions of the sulphur-introducing material, usually pyrite, and ample carbonaceous reducing agent, with calcium carbonate in varying proportions to produce various slag analyses.

Under such conditions, the iron oxide present simply reduces to metallic iron and then the iron melts to cast iron. Manganese oxide, iron sulphide from the pyrite and carbon may be assumed to react together as follows:



As a result, the iron of the pyrite is reduced to metallic iron and this iron is collected with the iron from the manganese-iron ore, while most of the manganese is converted to sulphide, which, mixed with any excess of iron sulphide left over, and a little calcium sulphide, melts together as matte, while of course, the silica, alumina, lime, etc. combine to produce slag. The phosphorus present is either volatilized or collects in the iron product—none is found in the matte.

The ores investigated in these tests were shown in Table 1, which is reproduced below:

	Analysis in Per Cent							
	Mn	Fe	SiO ₂	Al ₂ O ₃	CaO	MgO	S	P*
Cuyuna brown ore calcine..	15.2	44.4	12.9	1.31	0.82	0.10	0.02	0.26
Cuyuna black ore calcine..	15.7	32.9	25.9	2.68	0.90	0.12	0.02	0.07
Leadville carbonate ore . .	14.0	22.7	8.45	3.9	0.80	3.6	1.47	0.03
Chamberlain South Dakota carbonate ore	16.0	14.4	11.8	4.4	8.8	2.3	0.08	0.44

manganese from ores of lower grade and from manganese-iron ores, as a fused manganese sulphide "matte," produced by smelting together manganese-iron ores of low grade with a sulphur introducing material, such as pyrite, gypsum, and sodium sulphate. The

Regarding the Cuyuna Range Ores, this supply of manganese, is probably the best-known and most available, and has the best available equipment for mining and transportation to points of greatest manganese demand and would probably constitute the best and

n ese Resources

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PRIOR to tapping, while steel is still in the furnace, the last of a series of laboratory tests is taken to determine whether the steel contains the proper amount of carbon, manganese, silicon and certain other elements as specified in that order. Then, additions are made in the ladle during the tapping in order to bring the steel to the required chemical composition, as shown here.

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most certain immediate large source of manganese. The report states that, "A large tonnage of manganese is available in the manganiferous iron ores of the Cuyuna Range in Minnesota. There are two principal types of these ores, which have been designated by Newton as low-phosphorus high-silica ore, and high-phosphorus ore. Zapffe has discussed the same types of ores and called the former "black" and the latter "brown ores."

Of course, there has been a division line on the Cuyuna Range as elsewhere, between material gradable as "ore" and other material not quite so good excluded. The division in effect so far has been between material that the steel industry would accept in current processes and other material not greatly different and just under the profit-making line. A new process capable of treating lower grades of material profitably always changes this dividing line. There is always, in mining, a good deal more tonnage somewhat below the line than there is above the line, so any really improved manganese recovery process, as

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well as higher manganese prices, should indicate greatly increased reserves, comparable with the hugely expanded tonnages of lead and copper "ores" during the past 30 years of new recovery processes.

The Bureau of Mines has also recently reported on the probable amounts of the manganosiderite orebodies at Leadville that occurred wrapped around the silver-lead ores mostly mined out, and the oxidized parts of the manganosiderite and the amount of such ores shown to be substantial. Also the bureau has given attention to the ore at Chamberlain, South Dakota, and the manganese reserves there are enormous.

In the numerous tests described in R.I.3545, the iron present in the manganese ore and in the pyrite was practically all recovered as cast iron. The greater part of the manganese separated as sulphide or "matte," while silica, lime, alumina, etc., formed slag. The

manganese recovery in some of the tests was as low as 57 per cent but in the better proportioned melts the result was better, Table IV, is shown as follows, but with the addition by the writer of the figure for total manganese recovery in both metal and matte. This is proper, because, if anything, manganese in pig iron is worth more per unit than in matte or in "high-grade" manganese ore.

Test No.	Manganese Recovery in Per Cent		
	In Metal	In Matte	In Metal and Matte
37	1.1	88.6	89.7
36	1.1	88.3	89.4
38	2.7	83.1	85.8
39	3.2	81.0	84.2
40	2.7	88.6	91.3
41	3.1	84.2	87.3
42	4.0	87.6	91.6
43	5.5	86.3	91.8
44	5.3	84.0	89.3
47	7.4	78.1	85.5

The tests show, starting with ore containing 15 per cent or so of manganese, that recovery of manganese of better than 90 per cent should be realized.

The tests were cleverly contrived to ascertain a number of different applying factors and to

indicate the general proportions of ore, pyrite, etc., for optimum smelting results. This included investigation by test to learn the more favorable slag analyses the manganese percentage yields as affected by varying slag acidity, and by variations in amount of pyrite used, the effect of CaS in matte, the use of sodium compounds as affecting fluidity, and ease of separation of the three products, metal, matte and slag, and the conditions necessary to produce iron of a sulphur content acceptable in pig iron markets. (0.05 per cent or less)

This conclusion is stated in the report, "From the stand-point of high-grade matte formation, manganese recovery in the matte and metal, and minimum corrosion of refractory crucibles the most satisfactory slag contained 48 to 53 per cent SiO_2 , 15 to 18 per cent of Al_2O_3 , 4 to 6 per cent of Mn, 1 to 2 per cent of Fe, 1.5 to 2 per cent of S and 20 to 25 per cent of CaO plus Na_2O . This slag is in the extreme acid range; therefore less slag is formed in the treatment of siliceous ores than if a more basic slag were essential."

Ordinary ferromanganese preferred by steel melters contains 80 per cent of manganese and around 14 per cent of iron. After allowing for loss of manganese in the ferromanganese smelting furnace, there should be in the average of high-grade ores used some 90 parts of manganese present to 14 parts of iron, so that a suitable ratio of manganese-to-iron in matte would be about 6.4 to 1. In the tests, although proportionally large amounts of iron were produced, no difficulty was met in securing at least so favorable a ratio of manganese-to-iron in the matte. In Table VIII of the report, the average of all eight experimental manganese mattes showed this ratio at 7.7 to 1 which is well within such iron allowance.

It was pointed out in the report, however, that the presence of some iron sulphide in the manganese sulphide matte was favorable, as far as could be tolerated, in considerably reducing the melting point of the matte and facilitating the separation of the matte from the iron produced. Any amount of iron can be put into the matte

merely by using more pyrite in the charge.

A further conclusion reached from the well-planned tests, of very large importance, was that the final separation of the metal from the overlying matte should be conducted at relatively low smelting temperature, or from 1250 deg. to 1300 deg. C. As in that case, the separation of sulphur from the iron was good, particularly when the iron contained around 2 per cent of manganese, and the sulphur content of the iron was brought as low as 0.025 per cent, which is substantially better than the results of the average iron blast furnace. This is highly important because much sulphur is generally bad in foundry iron, and altogether bad in steel-making iron, as the steel melter is more poorly provided with methods of getting sulphur out of his steel, than the other metalloids, such as phosphorus, silicon and carbon.

The use of relatively low temperatures when at all possible, as is the case in this process with the comparatively fusible low-lime slags, is of course a happy condition in any smelting process, and the use of moderate temperatures was found to be favorable in all respects.

It was concluded that coal or coke high in sulphur was beneficial in supplying sulphur for matte formation, which is quite the reverse of the usual situation. The conclusion also would seem to be permissible that quite low-grade, high-ash coke would be much less prejudicial than in many smelting processes.

It was also found that the process worked practically perfectly in separating the phosphorus from the manganese product, and this is of interest when it is known that much manganese ore has too much phosphorous to make it acceptable in present ferromanganese practice. The phosphorus either collects in the iron or is partly volatilized. Phosphorus in moderate amounts does not disqualify pig iron for foundry use, and the steel maker has effective methods for disposing of the phosphorus content when too high.

Manganese sulphide is known to be quite soluble in very hot fur-

nace slags of varying character and would be largely dissolved in very hot slags, but the solubility in the slags made at the temperatures required for the process was satisfactorily low to give small manganese losses in slag. Of course, also, the practicability and desirability of using high-silica slags reduces the amount of slag to a much smaller amount than would be the case in blast furnace iron smelting where low-silica high-lime slags are necessary to take up the sulphur and withhold the sulphur from the iron produced.

The report states that, "The results of a large number of tests indicate that by this procedure a matte can be produced containing 50 to 55 per cent Mn, 5 to 8 per cent Fe, and 33 to 35 per cent of S: the remainder is occluded slag and other metals, chiefly calcium in combination with sulphur."

Tests were made to investigate the roasting of the matte and the elimination of sulphur, and it is stated that "roasting experiments indicate that the manganese-iron matte could be roasted successfully in equipment now used for sulphide ores and concentrates and a product with 2 to 3 per cent of S obtained." Such product would contain around 60 per cent of manganese and no phosphorus and only the silica of entangled slag.

Roasting the matte converts the manganese and iron to oxides and the calcium sulphide to calcium sulphate. The investigators took a somewhat overcritical interest in the complete removal of the sulphur by sintering, etc. That would not be possible as calcium sulphate is too stable, and the presence of calcium sulphate would not be objectionable in the conversion to ferromanganese as it is merely reduced back to CaS and dissolves in the slag, in which at ferromanganese smelting temperatures it is very soluble. There seems a little misunderstanding on this point and an idea that some residual sulphur in the roasted matte would introduce sulphur into the ferromanganese, but this is incorrect. There is a very considerable amount of sulphur present in the ferromanganese smelting furnace, introduced by the large amounts of coke supplied, but this

sulphur is almost entirely eliminated and probably accounts in considerable degree for the manganese losses, carried into the slag as dissolved MnS.

The authors of the report found that in a short roast period, from 90.6 to 96.2 per cent of the sulphur was eliminated, but did not note that the residual sulphur was mainly as CaSO₄ and not unburned sulphide.

In smelting the iron-manganese ores to matte, it was found that gypsum and anhydrite could be used to supply needed sulphur, but the amount of calcium and sodium sulphates that could be used would be limited by the amount of CaO and Na₂O that could be carried by the slag of an acid character. And of course, the use of pyrite has a considerable advantage in that the iron content of the pyrite is mainly recovered as pig iron.

The use of sodium sulphate is reported to be of distinct technical advantage in thinning the slag and contributing some sodium to the matte and making it more fusible. It is known that sodium sulphide forms fusible compounds with other sulphides as FeS, NiS, ZnS and MnS. At locations where

sodium sulphate is cheaply available it would be a useful material within limits.

No conclusions were stated as to the most suitable types of furnaces, whether blast furnaces, reverberatories, or electric furnaces. No reason appears why any of them may not be successfully used. The relatively low smelting temperature required can be accomplished in reverberatories, and electric furnaces will smelt practically anything smeltable. The difference between the manganese matting process and ordinary iron smelting in blast furnaces largely lies in the production of a third product, matte, which may be tapped with the slag and then settled and separated in a forehearth or ladle.

Cost estimates in reference to the Cuyuna ores appear very favorable for the utilization of these and many other ores in the production of better ferromanganese at lower cost and free of foreign freighting problems. Sulphuric acid makers equipped either with pyrites burners or multiple-hearth roasters should be able to roast the matter more easily than pyrites on account of the greater

vigor of the reaction. Existing blast furnaces of antiquated type should be able to conduct a smelting operation at temperatures several hundred degrees lower than that of the big new plants. Thus, it is believed that substantial amounts of better manganese oxide can be made available without construction of much new equipment, if any.

Some cost estimates based on using, for example, Cuyuna Range manganiferous ore of 15 per cent manganese content or of 20 to 25 per cent manganiferous rock, indicate a large operating margin at present manganese ore prices. There would be recovered with each ton of high-grade 60 per cent manganese oxide, around $\frac{3}{4}$ ton of good iron derived from pyrite ore of low to medium quality, in addition to the iron of the manganiferous ore, beside a ton or more of sulphuric acid. All this from a simple smelting operation inherently cheaper per ton than ordinary iron smelting.

Ed. Note: At a somewhat later date, a German process for handling low grade ores will be described.

Role of Electric Furnace in the Steel Industry

A REVIEW of electric furnace practice in the steel industry, particularly appropriate in light of the current emphasis on the specialized products of such furnaces, was presented by Harold E. Phelps, electric furnace superintendent of Rotary Electric Steel Co., Detroit, at the January meeting of the Association of Iron and Steel Engineers, Detroit district section. Phelps' paper dealt intimately with "The Economics of Electric Furnaces for Steel Making."

"Perhaps the greatest single advantage of the electric furnace over other types lies in its great flexibility," he asserted. "It is the only melting medium in which it is possible to produce the highly oxidized product of the Bessemer converter, the refined and partially de-oxidized product of the open hearth,

and completely de-oxidized and highly refined electric furnace steels of today, and even improve upon the cupola and air furnace in the production of gray iron and malleable.

"It is even possible to produce each one of these metals in successive heats without any change in the furnace and without loss of quality in the product. Like the open hearth, it also can be lined either acid or basic . . . there are a number of grades (of steel) that up to the present have been made successfully only in the electric furnace. It can truly be said that the electric arc furnace is the one and only universal furnace for ferrous melting."

The furnace is flexible in operation, as well as in its products, Phelps continued.

Of operating costs, he said, "The electric furnace, like the tractor, does not eat when it is not working. All plants have the problem of part time operation in dull times." For the benefit of steel plant engineers, he delved into operating costs, production techniques and control of quality.

A prediction that the open hearth furnace some day "may have to salute the newcomer," marked Phelps' concluding remarks. While experience has been limited to production of small tonnages of electric furnace steel, as against tremendous tonnages of other kinds, "The savings possible in supervision, labor and maintenance costs in an electric shop having the capacity of the large open hearths with from 10 to 20 furnaces is something of a challenge to the imagination," he asserted.

How to Plate Brass

TWENTY-SEVENTH in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

IN discussing alloy plating (see THE IRON AGE, Oct. 17, 1940, page 36), it is very fitting that brass should be first as it was the first alloy ever to be plated commercially. This alloy has been deposited for almost the last century, although the papers written on this subject were few and far between until the last 20 years. Since that time there have been reports of every kind published from all over the civilized world.

It is interesting to note that brass was about the only alloy deposited until a few years ago. The reason for this is rather simple. The plater knew very little chemistry and no electrochemistry. In order to plate an alloy commercially and produce uniform results he must have some kind of simple indicator, which, in the case of brass, is its color. If too much copper was present a red or brown alloy was obtained. On the other hand, if too much zinc was present a bluish alloy was produced. By using his eyes it was possible for the ordinary plater of 75 years ago to reproduce results commercially.

At this point it might be well to point out that the word "brass" indicates an alloy of copper and zinc with the former predominating.

All commercial brass plating at the present time is done from cyanide baths. The reason for this is that the potentials of the two metals are so different, there is little chance of making them nearly equal to each other unless a complex molecule is formed. Commercially

brass is usually plated for color only. However, there is one exception when the alloy is deposited in regard to its composition only. This is in the hard rubber truck tire industry or in any other field where a very strong bond between metal and rubber is desired. It has been found that a certain composition of brass, if plated on the steel rim, produces a maximum amount of adhesion between the steel and the vulcanized hard rubber.

In most cases, however, the yellow brass is deposited on steel hardware lighting fixtures and miscellaneous parts for appearance only. Very little protection on steel against corrosion is afforded by brass. However, in some cases it is used as an undercoating for nickel deposits and as a medium for taking on an oxidized finish which produces a variety of colors.

An average brass solution contains a copper-zinc ratio of approximately four to one. A typical formula is given below:

	Oz. per Gal.
Copper cyanide	4.2
Zinc cyanide	1.5
Sodium cyanide	6.7
Free cyanide	1.5
Sodium carbonate	4.0
Ammonium hydroxide (28 per cent)	0.12
pH	9.8-10.3

Upon analysis this should be about as follows:

	Oz. per Gal.
Copper cyanide	4.2
Zinc cyanide	1.5
Free cyanide	1.5
Sodium carbonate	4.0

The bath should be used under the following conditions:

Temperature	75-100 deg. F.
Current density	3-5 amp. per sq. ft.
Voltage	2-3 volts
Anodes	80 per cent copper, 20 per cent zinc (annealed brass)

The bath may be operated at room temperature, but a faster and more uniform colored deposit will be obtained if the higher temperatures are used. This is due to the increased conductivity of the bath and to the increased cathode efficiency. As a general rule increasing the temperature slightly increases the amount of copper deposited.

The pH of a commercial brass bath should be in the neighborhood of 9.8 to 10.3 for best results. It has been noted by Meyer¹ that deposits obtained in the region of 10.4 to 12.5 were spotty and non-uniform. It was also pointed out that good deposits could be obtained above a pH of 12.5. Ammonium hydroxide acts as a good buffing agent. This material will be mentioned later.

The free cyanide can be varied between one and 2.5 oz. per gal. However, results seem to indicate that 1.5 oz. per gal. produces the best deposits. If the free cyanide becomes too low anode polarization occurs. This is just another way of saying that the anode fails to dissolve if the cyanide content is allowed to fall below a minimum. The function of free cyanide in a brass bath is to unite with and render soluble the ions of copper and zinc formed by electrochemical action at the anode surface. It will be remembered that cuprous cyanide is insoluble in water and would therefore precipitate on the anode surface as an insoluble film provided there were not present some material which would render the compounds soluble. If the free cyanide is allowed to become too high good

and Bronze

By C. B. F. YOUNG
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New York

Operating data for the new processes which have been developed. Commercial application of brass and bronze plating, and what may be expected in the near future.

anode corrosion results but a large amount of hydrogen is liberated at the cathode which means that very little current is used in depositing brass. Thus, a high free cyanide content produces a low cathode efficiency which, of course, is to be avoided. This will lead to a depleted solution if operated for any length of time. The free cyanide, as already stated, unites with the compounds produced at the anode and forms a double cyanide which is soluble in aqueous solutions.

There are other materials which can be added for the express purpose of aiding anode corrosion and preventing it from becoming passive. A good example is Rochelle salts or potassium sodium tartrate ($\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$). This material forms soluble complex metal tartrates and puts the materials into solution. The tartrate is used in concentrations of 1 to 6 oz. per gal. in brass baths. For best results about 2 oz. per gal. are used.

The carbonate content will have a tendency to increase as the bath grows older. However, this is somewhat offset by the dragout. Too much carbonate should be avoided as an excess creates an anode sludge and increases anode polarization. This can be overcome somewhat by increasing the free cyanide and metal content.

Copper Content Varies

On the other hand too low a carbonate should be avoided because of the poor conductivity resulting. Also this material acts as a buffer in maintaining the proper pH and prevents the precipitation of complex salts, under many conditions. It is preferable to add metallic salts as the cyanide instead of the carbonate which prevents an excess of this material.

The copper content of a brass solution can vary from 1.5 to 5 oz. per gal., provided the other mate-

rials are in the correct ratio. It is a definite fact that the higher the metallic content the higher the cathode efficiency and the higher the current density which can be used under a given set of conditions. Very little change in color occurs regardless of the concentration of copper, provided, of course, the zinc and free cyanide contents are varied accordingly.

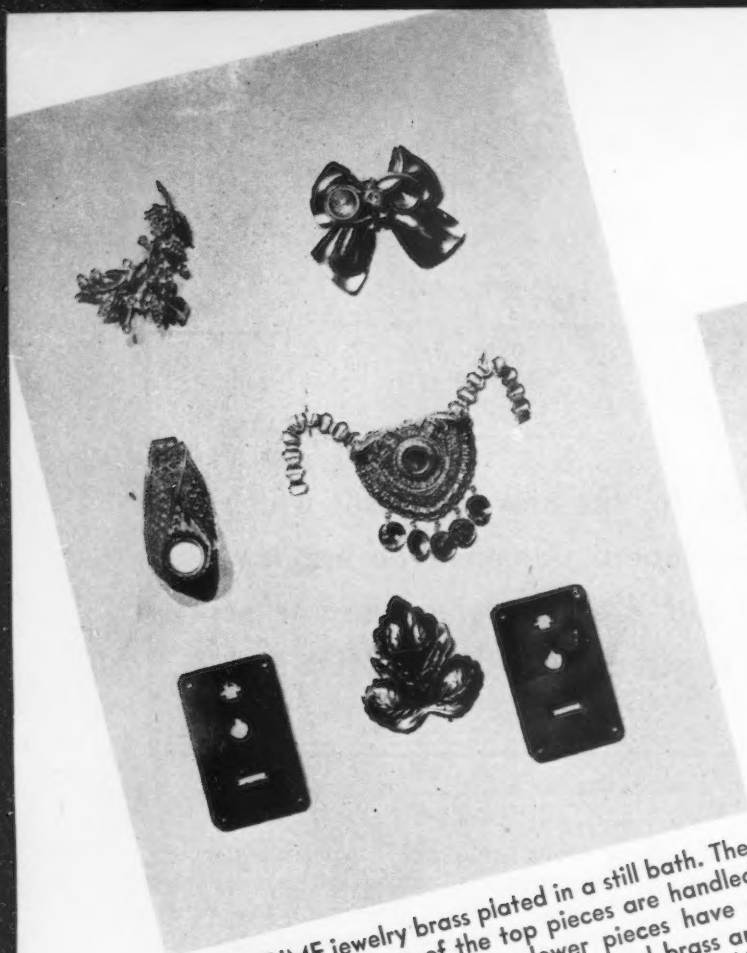
The zinc content is dependent upon the concentration of copper, as has been pointed out already, and should be approximately 1 zinc to 4 copper, or 3 cuprous cyanide to 1 zinc cyanide. The yellow brass deposited analyzes from 70 to 80 per cent copper and 30 to 20 per cent zinc. The 80-20 electrodeposited alloy has the same color as 65-35 per cent cast high brass. The reason for the two different alloys having the same color is undoubtedly due to the microstructure of the electrolytic brass. If the zinc content becomes too high a pink colored alloy is produced, especially if low temperatures are being used. This can also happen if the zinc content becomes extremely low. It has been shown that brass deposits having more than 40 per cent or less than 20 per cent zinc have a tendency to be reddish in color. Poor deposits usually occur if high carbonate and high zinc contents are present simultaneously.

Peculiarly enough a small amount of ammonia in a brass bath greatly improves the color of the deposit and has a tendency to aid the deposition of the same alloy under a variety of conditions. Ordinarily

the brass alloy deposited depends especially upon the copper-zinc ratio and the cathode current density. However, if some ammonia is present the color obtained is almost uniform, even over a large set of conditions. This is undoubtedly due to a complex copper ion being formed which has a smaller ionizing constant than that of the $\text{Cu}(\text{CN})_2$. Brass baths containing ammonia have a higher cathode efficiency than those without this material.

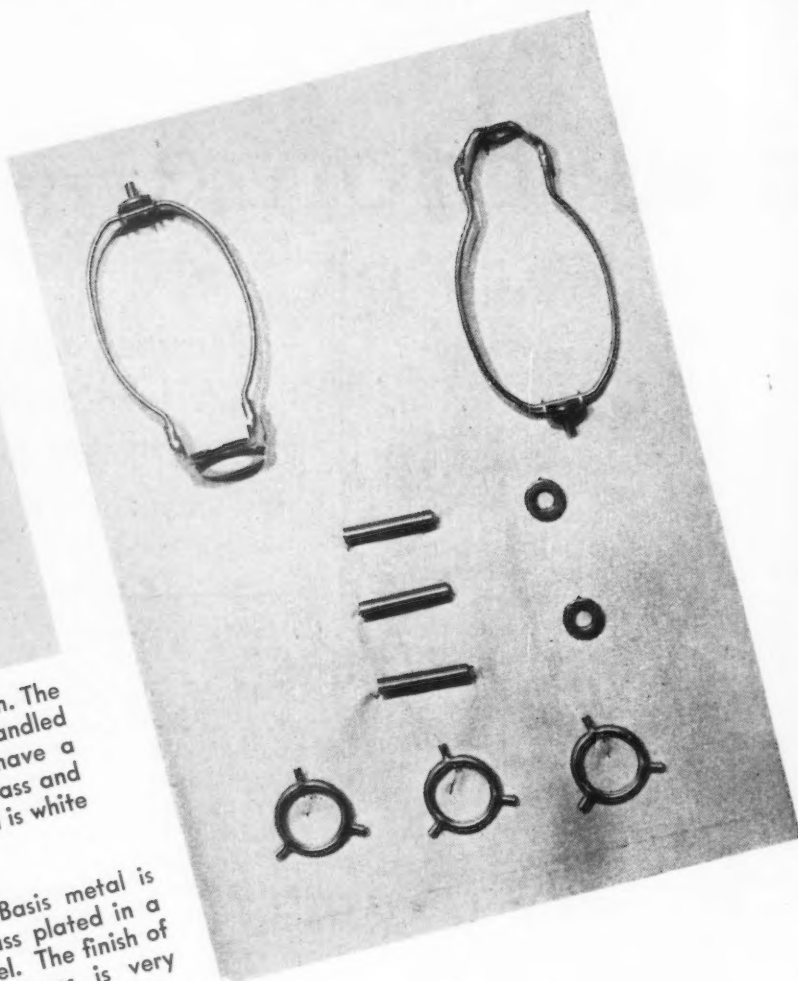
Ammonia has been added to brass baths for about 90 years. Today most of the jewelry houses add this material to their bath in order to produce a uniform colored deposit which is so essential for the coloring process that follows. As a general rule no definite amount of ammonia is added at these establishments. The material is dumped in at different intervals and is introduced by the workmen directly. A very thorough research on this subject has been carried out by L. C. Pan². He determined the effect of three variables on the deposits, namely (1) the amount of ammonia in the bath, (2) the cathode current density used and its effect when ammonia is present, and (3) the copper-zinc ratio in the electrolyte. The observations covered color, composition of the brass alloy deposited and cathode current efficiency.

It may be asked if the pH is affected by the addition of ammonia. The answer is no. The reason for this is that the pH of the brass bath



COSTUME jewelry brass plated in a still bath. The intricate shapes of the top pieces are handled without difficulty. The three lower pieces have a two-tone effect, the light parts being red brass and the dark being yellow brass. The base metal is white metal casting.

PARTS of lamp fixtures. Basis metal is steel. All have been brass plated in a barrel. The finish of the pieces is very uniform.



is not increased by the addition of this material, as it is a rather weak base.

In regard to the effect of ammonia in brass baths when current density is taken into consideration, it might be stated that an even-colored deposit, which varies from yellow to pink as the current density is increased, is produced. Without any ammonia present, dull yellow to uneven yellow deposits are generally obtained. At low current densities the former is produced while at higher current densities the latter prevails.

Fig. 1 shows data² concerning a brass bath having a copper to zinc ratio of 3.54. The graph is self explanatory. It will be noticed that a variety of finishes can be produced by changing only the current density and concentration of ammonia. For instance, by varying the ammonia from 0-2.6 gm. per liter using a current density of 2 amp. per sq. ft. the following plates can be produced: dull dark yellow, bright yellow, warm yellow and golden yellow. The number next

to the points indicates the Cu:Zn ratio in the deposit.

One very interesting point will be brought up here which concerns the color of the deposit as compared to its composition. If high concentrations of ammonia are used (2.3 gm. per liter) along with low current densities a rich gold deposit is obtained. The analysis of these deposits shows a very low amount of copper, approximately 48 per cent. The rest is zinc. This is undoubtedly produced by the shape of the brass crystals formed during electrolysis, as all brasses having this much zinc when produced by thermal methods do not even approach this color.

The cathode current density affects brass deposits tremendously. This can be illustrated very well by observing an irregularly shaped object being plated in an ordinary brass bath. It will be noted that the deposit near the tip is quite different in color from the deposit plated near the inside of the object.

It will be recalled that a higher current density is obtained near the points. It has been found with an ordinary brass bath that as the current was increased, the zinc first decreased and then increased. The slope of the curve is very steep either ascending or descending.

In Fig. 2 this is illustrated very well². It will be seen that the curve representing the bath having 0 gm. per liter has the largest hump of the family represented. When 0.1 gm. per liter of ammonia is introduced there is an appreciable decrease in the rise while, if the ammonia concentration is increased to 1.5 gm. per liter a straight line is produced. Incidentally 1.5 gm. per liter is equal to 226 c.c. of 28 per cent aqua ammonia per gallon of plating solution.

These results alone show the tremendous importance of ammonia in a brass plating bath. It is quite possible to obtain a uniform deposit in a proper brass bath of an irregularly shaped object. This addition material is the answer to a plater's dream. Thus the material

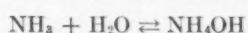
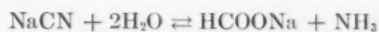
not only produces uniform deposits but it aids in producing attractive colored plates.

Copper-Zinc Ratio

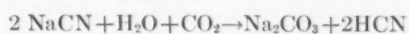
It is common knowledge that brass formulas are about as numerous as plants doing brass plating. The copper-zinc ratio can vary widely provided other variables are also changed so as to produce corresponding changes. One of these variables is ammonia. To illustrate this let us take a bath having a copper zinc ratio of 3.5. If this bath is used at 2.0 amp. per sq. ft. the deposit will contain about 40 per cent zinc. If the current density is increased to 10 amp. per sq. ft. a deposit is obtained which has 18 per cent zinc. If now 1.5 gm. per liter ammonia is added, the zinc in both cases is increased to about 50 per cent. Regardless of the copper-zinc ratio, deposits are obtained which analyze about the same. It might be said here that a good brass deposit can be obtained over wide variation of the ratio of copper to zinc provided enough ammonia is present. Also the more copper in the bath, the more ammonia is re-

zone of action and, regardless of the concentration of molecular copper, very little of the material ionizes to produce the cuprous ions. Also the more ammonia present, the smaller the concentration of the copper ions. It might be pointed out that while the ammonia unites with copper to form a complex it does not form a similar compound with zinc. Therefore, zinc is just as free to ionize as it was before the addition of the ammonia. Such a condition is known in alloy plating and will be pointed out again in this series when cadmium-zinc alloys are discussed.

The question might arise as to just how the plater got along without ammonia before these interesting observations were made. The point is that hardly any brass baths are without ammonia due to the fact that this material is formed by the hydrolysis of sodium cyanide. Thus:



It is also possible to decompose sodium cyanide with the carbon dioxide of the air as follows:



cathode efficiency was increased up to approximately 20 per cent provided 1.5 gm. per liter of ammonia was added.

To summarize the effects of ammonia:

(1) Ammonia improves the color of brass deposits over a wide range of current densities and copper-zinc bath ratios.

(2) Bright yellow brass plates may be produced provided ammonia is present using various copper-zinc ratios. The plates produced are approximately the same in color but different in composition.

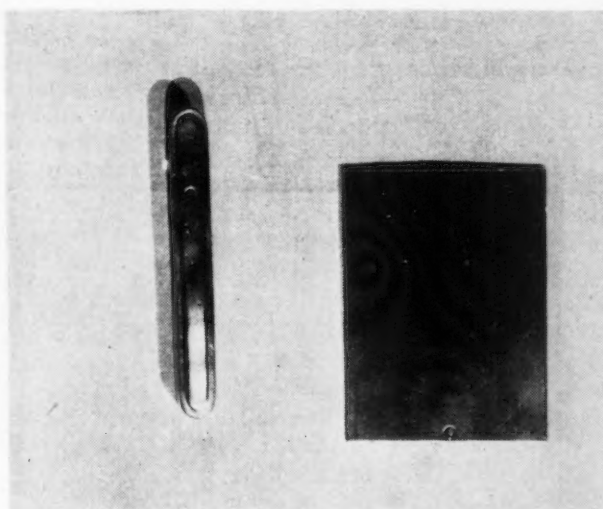
(3) The effect of different variables, such as copper-zinc ratio and current density, are kept at a minimum.

(4) The cathode current efficiency is increased materially when there is present in the bath appreciable amounts of ammonia.

There are several addition salts which may be added to a brass bath that produce beneficial results under certain conditions. However, these materials, if added haphazardly, will lead to trouble sooner or later. The author would like to emphasize here the importance of keeping all plating baths as simple as possible. Do not add a salt unless there is good scientific reasoning and experience for doing so. The average plater or anyone connected with plating will do well to reread and digest every word in the above sentence. Besides the materials already discussed there are several compounds which may be added to brass baths. These are: (1) sodium hydroxide, (2) sodium bicarbonate, (3) sodium bisulfite, (4) sodium arsenite, (5) lead salts, (6) tin salts, and (7) nickel cyanide. These compounds will be discussed individually.

Sodium hydroxide or caustic soda can be added in small amounts provided the pH is too low, if the pH range of 9.8 to 10.3 is being used. This material can be added when this further drops below 9.8. However, if too much is added the pH of 10.3 will be passed and the range lying between 10.3 and 12.5 will be reached. It will be recalled that brass deposits produced here are non-uniform and spotty. Therefore, the material added would lead to trouble. It would be possible to add more and obtain a pH of 12.5 or reduce this factor to the original condition by the addition of an acid or acid salt. A continued addition at regular intervals is not

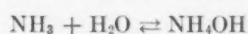
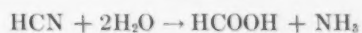
ZINC-BASE alloy die casting (left) and steel strip (right), both plated with brass in a still tank. This demonstrates the wide variety of conditions handled by the brass bath.



quired. Another point worth mentioning is that the more ammonia in the electrolyte, the wider the range of metal ratio in the electrolyte over which the ordinary yellow brass deposit is produced.

There undoubtedly is a reason for all the above. The author believes it is a reaction between ammonia and copper to form a complex which is less ionized than the double copper cyanide. This being true, the copper ions are removed from the

The HCN thus formed can react with water as shown below:



Thus again ammonia is formed.

It might be thought that the addition of ammonia to a brass bath due to its decreasing the copper ion present might lower the cathode efficiency. However, Pan² found the opposite effect. In nearly all cases investigated it was found that the

recommended as it undoubtedly will lead to trouble.

Sodium bicarbonate is similar to sodium carbonate except that it has one sodium and one hydrogen instead of two sodiums. Thus, the material is more acid in nature than the sodium carbonate. It aids conductivity, prevents precipitation of some complex salts and acts as a buffer in much the same way as does sodium carbonate. However, it is more acid and therefore decreases the pH when added. The only time this material should be introduced is when the pH is too high. Whenever carbonate is desired always add sodium carbonate unless the pH should be lowered.

What has been said about the bicarbonate applies also to sodium bisulfite. However, there may be some instances where the bisulfite is preferred due to its chemical properties.

Sodium arsenite is added in very small quantities to brass baths as a brightener. This is generally made by adding arsenic oxide to a sodium hydroxide solution, thus forming sodium arsenite. This can be made by dissolving 2 lb. sodium hydroxide to two quarts water. After it is dissolved, add 1 lb. of arsenic oxide. For every 100 gal. of brass solution one fluid ounce of the brightener can be added. An excess should be avoided as it produces a black coating on the anodes which is undesirable. It is known that arsenic co-deposits with the brass and in so doing interferes with the crystal growth of the brass crystals thereby producing a different deposit. Also, the element decreases the tendency for hydrogen to be liberated, thereby increasing the cathode efficiency. In some cases arsenic aids the deposition of zinc over copper.

If lead salts are added in very small amounts they also produce a brightening effect. Here again the author feels that the lead is also co-deposited with the brass and in so doing interferes with the normal grain growth of the alloys, thereby altering the deposit obtained. This material should not be added in amounts greater than 0.0013 oz. per gal. If larger amounts are added the deposits obtained will be dark and loosely adherent. Also the anodes become passive and are coated with a dark deposit. Springer³ found that small amounts of lead produced green

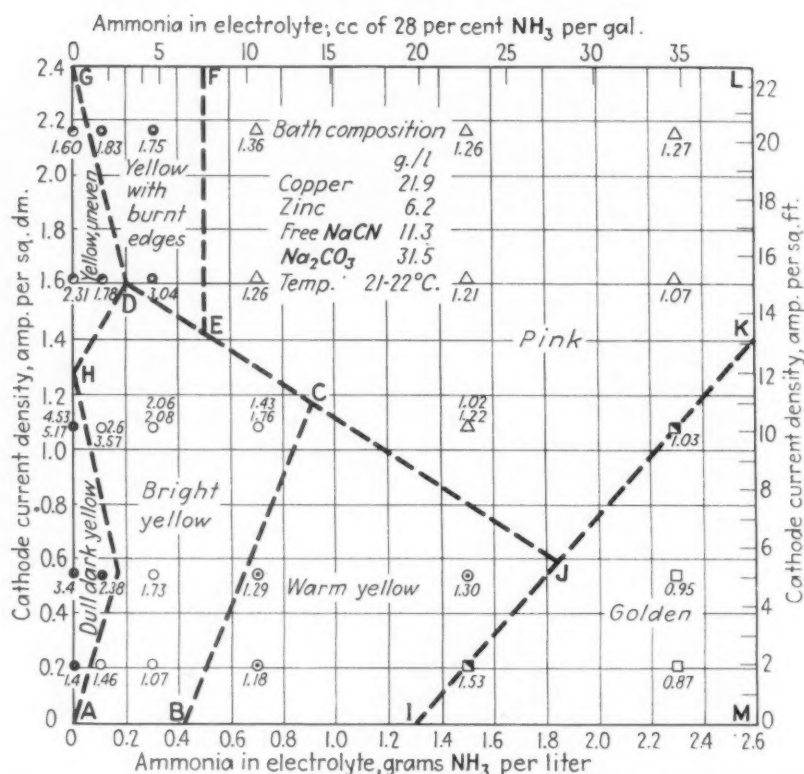


FIG. 1—Color and composition (Cu-Zn ratio in deposit, as indicated by the numbers next to the points) of cathode deposit from a cyanide brass plating bath having a Cu-Zn ratio of 3.54.

brass deposits and small amounts of cadmium caused the deposits to be red.

A small amount of tin salts is helpful many times. This material co-deposits and forms the ordinary bronze alloys. It is the opinion of the author that large concentrations of this material can be added to a brass bath without producing any bad results provided other variables are adjusted and controlled accordingly.

A small quantity of nickel cyanide, if added to a yellow brass solution tends to brighten the deposit. Nickel will co-deposit with metals from the cyanide bath to form alloys which are harder and more stable in color. Care must be taken to see that very little organic material is present when this compound is being used. Otherwise a foggy deposit will be obtained. This is especially true if the nickel content in the alloy becomes appreciable.

There is one other type of addition material which will be mentioned, which is phenol, an organic compound. This material acts like an addition agent when added to the bath, for it slightly increases the potential drop of the solution. The

material acts as a brightener when used in amounts up to 0.1 oz. per gal. Phenol aids the deposition of copper by retarding the plating of compounds. In this way the zinc ion is decreased, which in turn increases the single electrode potential of the metal. Thus, copper, not being affected, plates out instead of zinc. Therefore, when using this material as a brightener it is usually necessary to increase slightly the concentration of the zinc so as to offset the action of the phenol. This can also be accomplished by increasing slightly the free cyanide content which, it will be recalled, aids the deposition of zinc by tying up the ions of copper.

It might be well to point out here that most brass plates are lacquered so as to protect them from tarnish and corrosion. This is true also of the bronze alloys to be discussed. However, the lacquering will not be discussed herein.

It will be noted that nothing has been said about the type of plating used, viz., still plating, semi-automatic, automatic and barrel. In general the same type bath is used in the first three while a slightly different composition is used for the barrel type. This is caused by

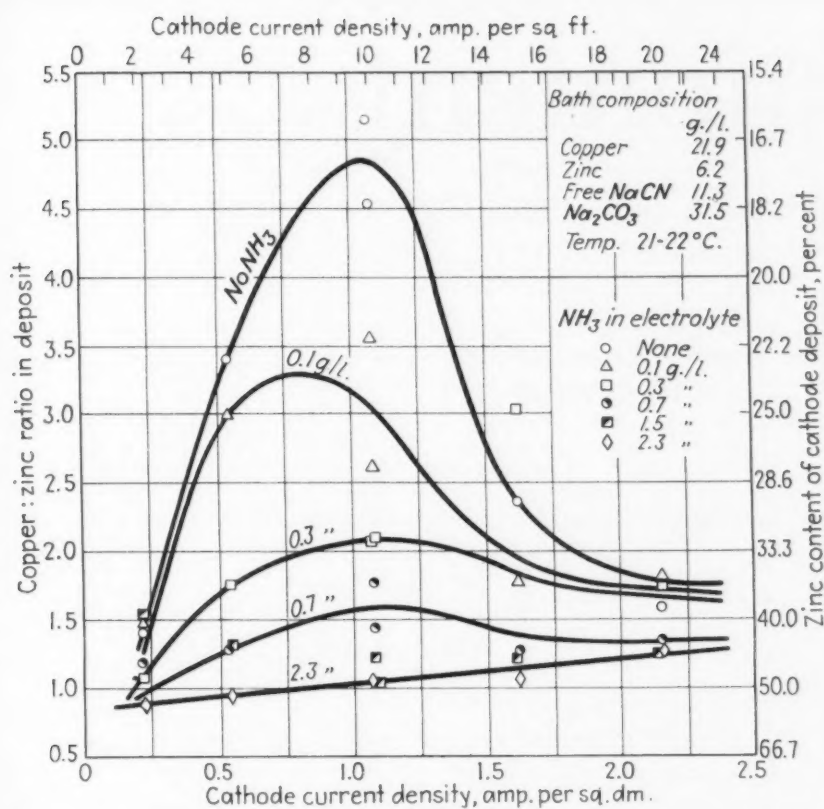


FIG. 2—The effect of cathode current density and ammonia in electrolyte upon composition of cathode deposit from a cyanide brass plating bath having a Cu-Zn ratio of 3.54.

the different conditions existing in the last type. Perhaps more will be written on this subject in a paper after the various alloys have been discussed.

Bright Brass Plating

This paper would not be complete unless a recent process for plating bright brass is mentioned. There have been some attempts made to produce bright or semi-bright plates by adding brighteners to brass baths. These consisted of arsenic compounds, phenol, tartrates and similar materials. In the last few years certain types of wetting agents have proved beneficial to some plating baths, and copper is one of them. It is a rather logical step to try these materials on brass baths, which is undoubtedly what has been done in the process mentioned below. In discussing the process herein it must be kept in mind that data are not available on the different constituents in the solution. The author would like to give more detailed information but this is impossible under present conditions. Therefore, the information available is presented with the hope that it may prove advantageous to some readers because of the desirable properties character-

istic of the solution. The process is known as the du Pont high speed brass process, developed and marketed by E. I. du Pont de Nemours & Co., electroplating division, Wilmington, Del.

The new process makes possible at least one method of rapidly producing smooth bright or semi-bright deposits of brass. The bath is easily made up by dissolving a prepared salt mixture in water. The pre-mixed salts contain copper, zinc and sodium cyanides, wetting and addition agents and salts, all in the correct proportions. Typical of baths which contain certain types of organic compounds, uniform bright deposits can be obtained over a wide range of conditions. It will be recalled that ammonia added to a brass bath gives uniform deposits over a variety of conditions. This has been pointed out earlier herein. It must be remembered that ammonia is very volatile and hard to control. However, homologues of this compound are easily obtainable and work well in brass baths. Such compounds are either amines or amides.

In order to illustrate this bath, it has been compared with the usual type. Below is a table in which the

composition and operating conditions of each are compiled.

Usual Bath	Oz. Per Gal.
Copper cyanide	4.00
Zinc cyanide	1.25
Sodium cyanide	7.5
Sodium carbonate	2.0

du Pont Bath
Premixed salts containing copper cyanide, zinc cyanide, sodium cyanide, sodium carbonate, and addition salts, 44.8 oz. per gal.; addition agent, 2 cc. per gal.

Operating Conditions:

Anodes
Brass (usual bath):
Copper, 70 to 80 per cent.
Zinc, 30 to 20 per cent.
Brass (du Pont Bath):
Copper, 70 per cent.
Zinc, 30 per cent.

Temperature
For usual bath, 75 to 100 deg. F.
For du Pont bath, 105 to 125 deg. F.

Maximum Anode Current Density
For usual bath, 10 amp. per sq. ft.
For du Pont bath, 25 amp. per sq. ft.

Anode Current Efficiency
For usual bath, 70 to 80 per cent.
For du Pont bath, 90 to 95 per cent.

Cathode Current Density
For usual bath, 10 amp. per sq. ft.
For du Pont bath, 25 amp. per sq. ft.

Cathode Current Efficiency
For usual bath, 50 to 70 per cent.
For du Pont bath, 50 to 80 per cent.

The usual plating equipment can be used for the process, and this is a very important item to be considered. This process may be substituted for ordinary brass plating and can be used to produce thick deposits up to 0.001 in. or more. The fine grained deposits thus obtained are easily buffed. Here it is well to state that the bath is superior to the ordinary brass baths due to the faster plating of the deposit and the thick deposits obtainable. An addition agent which is added to the solution prevents pitting, improves the luster of the deposit and prevents objectionable fumes which are generally produced at higher current densities in ordinary baths.

It will be noted from the table that there is a decided advantage in the anode current density used in the new process. It can be as high as 25 amp. per sq. ft. without producing an insoluble film on the anode which, after all, is nothing more than anode polarization. This is an improvement over the old bath. However, it has been shown by Wagner and Beckwith⁴ that the current density could be up to 20

(CONTINUED ON PAGE 104)

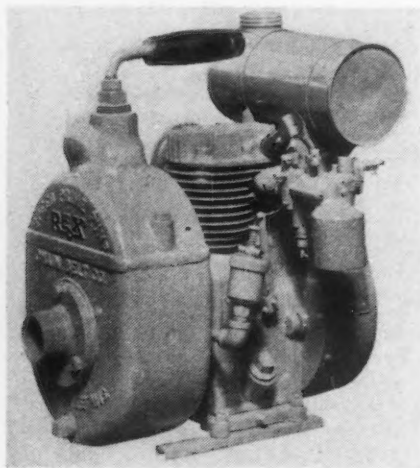
New Equipment . . .

Plant Service Apparatus:

Here we continue an account, begun last week, of latest developments in new plant service devices, such as motors and pumps, and safety appliances like goggles and gas masks.

Light Weight Centrifugal Pumps

REX JUNIOR, a new centrifugal pump of 3000 gal. per hr. capacity, weighing 54 lb. and measuring 15¼ x 11¾ in. by 15¾ in.

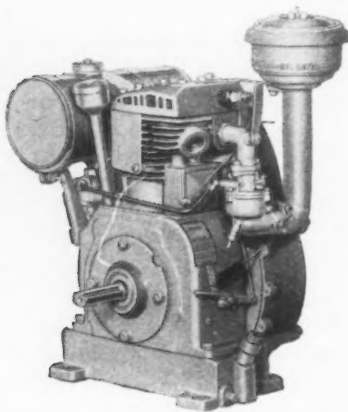


high is being produced by the *Chain Belt Co.* of Milwaukee. This 1½ in. pump has the patented Rex peeler, a device which peels the air from the whirling impeller and thus speeds up the prime. It has a large semi-steel recirculating water chamber equipped with an aluminum cap to save weight and is powered by an easy starting single cylinder, air cooled engine of ¾ to 1 hp. This engine is equipped with an automatic governor to speed up the motor when the pump catches its prime and starts to lift water.

Industrial Gasoline Motors

AIR cooled four cycle gasoline motor is announced by the *Briggs & Stratton Corp.*, Milwaukee. The output of model ZZ is 7.7 hp. at 3200 r.p.m. Piston displacement is 22.97 cu. in. with bore and stroke 3 x 3¼ in. Ignition is supplied by a dust and moisture-proof high tension flywheel magneto. The motor is equipped with

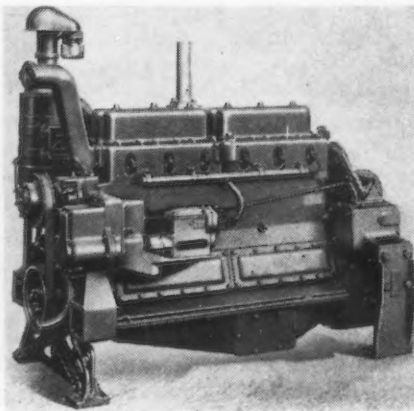
silchrome exhaust valve with alloy steel inserted seat, float feed type carburetor, adjustable mechanical governor, drop forged crankshaft, pump and splash lubricating system. The fuel tank capacity is 1¼ gal., overall dimensions 20 x 22 x 24 in. height and weight is 134 lb. A lightweight model ZZL is also available, as is ZZR with 6 to 1 gear reduction drive and ZZP with



direct mounting crankcase, machine faced and tapped for direct assembly of driven unit.

Gas Engines

THREE models of heavy duty natural gas engines have been announced by *Caterpillar Tractor Co.*, Peoria, Ill. Model 4600 G



has six cylinders; 4400 G and 3400 G, four. They develop 74, 48 and 34 hp. respectively at 1600 r.p.m. The engines have superfinished crankshafts with Hi-Electro hardened journals. The fuel system is set for the most efficient combustion of natural gas, but will satisfactorily burn gasoline for short periods. A filter is included to clean the gas and to handle gas pressures as high as 150 lb. at the supply. These models are available fan-to-flywheel or as complete power unit with enclosed clutch and radiator. Electric sets incorporate a self-regulating generator of 30, 20 or 15 kw. capacity.

Group Washing Fixtures

STAINLESS steel group washing fixtures are now available from *Metalloid Engineering & Mfg. Co.*, Cincinnati. Fabricated of 26 gage satin finish Armco stainless by a patented process, the largest size manu-



factured will accommodate 10 persons and requires only 16 sq. ft. of floor space. Joints of the bowl sections have stainless steel beads and molded rubber gaskets. The sectional construction employed is said to make possible quick and economical replacement of individual sections in case of damage. Base is made of 12 gage material with removable panels for plumb-

ing fixtures. Fixtures are equipped with a Monitor sprayhead which mixes hot and cold water to any temperature at constant pressure.

Illuminated Lens for First Aid

FIRST aid posts in plants will welcome the new Super Sight magnifying and illuminating lens which is produced by the *Boyer-*



Campbell Co. It facilitates the removal of splinters, of foreign bodies from the eye, etc. It may also find application in the shop for inspection and precise tool adjustments.

Improved Goggles

DECREASED weight, closer fit through improved design and therefore greater comfort are claimed for the new Monelite goggles, manufactured by the *Dockson Corp.*, 3839 Wabash Avenue, Detroit. The bezel is made of Dow-



metal allowing greater vision and easy removal. Baff-Vents may be inserted which give protection towards the side, yet allow ventilation.

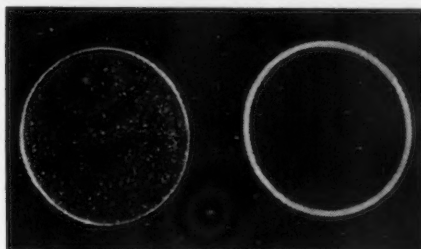
Concrete Floor Dyeing Material

WITHOUT previous preparation of the floor a new coloring material may be applied to concrete floors. This will penetrate the cement to a maximum depth of

$\frac{1}{4}$ in. and by virtue of a chemical combination imparts a permanent color to the base. This is the Flor-Dye No-Buff material of *Truscon Laboratories*, Caniff & G.T.R.R., Detroit. A deeper and richer hue may be produced by finishing the dyeing of the cement with a dressing which sets the dye and makes the color more uniform.

New Type Safety Goggle Lens

IN an actual flash welding service test, the Tulca safety lens (below, right) produced by the *Univis Lens Co.*, Dayton, Ohio, was apparently unaffected by flying particles of hot metal and sparks after 84 hours of service. The ordinary tempered glass lens (left) was so pitted after 16 hours that it was



unfit for further use. The Tulca lens is made of a new non-shattering material.

All Purpose Gas Mask

THE *Acme Protection Equipment Co.*, 3645 Liberty Avenue, Pittsburgh, produces a gas mask for the protection of workers and firemen, which features full vision and protection against fumes, carbon monoxide, a long effective life and a warning by odor when the protective catalyst is almost exhausted.



Side Shields for Goggles

CELLULOSE acetate side shields either tinted or clear for use on workmen's spectacle type goggles are produced by the *Kimball Safety Products Co.*, 7314 Wade Park Avenue, Cleveland. These afford added protection to the worker and are easily applied or replaced.

Safety Lamp

FOR plant inspection in chemical and heavy industries the *Safeguard Electric Co., Inc.*, 1 DeKalb Avenue, Brooklyn, is putting on the market a new metal lamp guard furnished with a Water-Sealed socket. It is claimed that this lamp is completely water proof and that the chances of an operator being subjected to shock or burn are almost non-existent.

Face Shields

BOYER-CAMPBELL CO., 6540 Antoine Street, Detroit, produces gimp bound plastacele window face shields which provide a greater flexibility for adjustment



to the face of the operator but do not lose their shape. Window sizes are 0.02 in. thick and 4 x 9 in. or 6 x 9 in.

Industrial Skin Protection

MILBURN CO., 905 Henry Street, Detroit, is the producer of a series of creams and ointments designed to prevent the infection of workmen's skin in industrial enterprises. Ply No. 1 is used against dirty grease and oil paint in all forms, etc.; Ply No. 2 against petroleum products, cutting

compounds, etc.; and Ply No. 6 against acids. In view of the large percentage of skin troubles among occupational diseases, this development claims to deserve particular attention.

The same company produces Ply No. 9, a liquid for the protection of materials against the corroding action of perspiration and of the workman against skin irritation that may lead to disorders. It is applied by merely dipping the hands into the fluid and allowing it to dry.

New Filter Cartridge

FOR its versatile respirator R-1000 the *American Optical Co.*, Southbridge, Mass. announces a new filter cartridge, thus providing five interchangeable types of protection in one respirator. The new filter gives comfortable protection against toxic dusts formed by crushing, grinding or abrading such solids as lead, cadmium, arsenic, etc. The other cartridges previously brought out are: against pneumoconiosis - producing dust



from quartz, ores, etc., against low concentrations of fumes encountered in paint spraying, or other light organic vapors, against low concentrations of acid fumes and gases, against combined acid-organic gases and vapors.

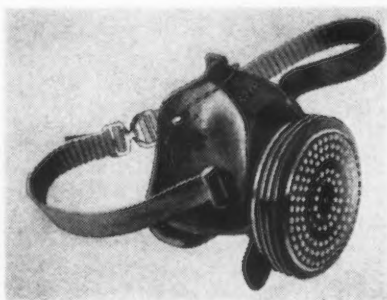
Goggles for Spectacle Wearers

NO. 323 Duralite Coverglass goggles have been specially developed by the *American Optical Co.*, Southbridge, Mass., to provide dependable, comfortable protection for gas welders who must wear glasses for correction of vision.

The goggles fit well over any style of spectacle, and protect the eyes from flying sparks and scale, light rays and glare, providing ventilation through louvers.

Light Weight Respirator

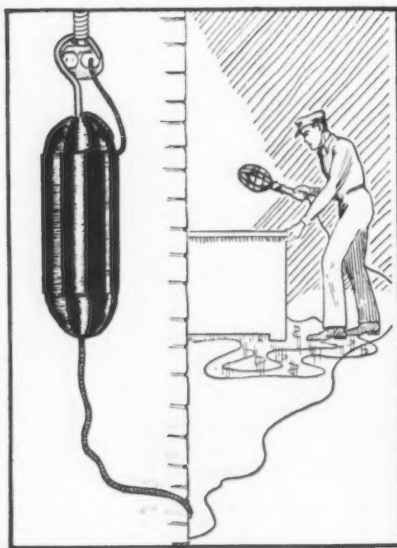
CLAIMED to be the lightest respirator to receive the U. S. Bureau of Mines approval, the Willson Bantam made by *Willson*



Products, Inc., Reading, Pa., can be worn for long periods without causing any noticeable discomfort to the workman. It has a throw-away filter and is strong in construction.

Safety Transformer

TO reduce accidents occurring in handling electric extension cords in wet and damp places, the *Newark Transformer Co.*, Newark, N. J. has just recently placed on the market a safety transformer. It is a light, small cylindrical device the outer shell of which is made of a non-corrosive, non-conducting and tough compound shell enclosing an absolutely water proof transformer element provided with a hook for carrying and hanging. The apparatus reduces current from 110 or 115 volt to 6.



Sweat Bands

TWO new sweat bands made of fine pore cellulose sponge, securely stitched to a fabricoid band with an inner lining of cork, are being marketed by *Jackson Electrode Holder Co.*, Detroit. Bands will absorb more than 15 times their weight in moisture and can be cleaned by permitting water or an antiseptic solution to run through sponge cellulose. Bands especially designed for use with eyeshields are also available.

Stapler for General Use

ALL models of the new Burgess model A tacker can be used for steel staples of leg length of $\frac{1}{8}$, $\frac{3}{16}$ and $\frac{1}{4}$ in. without adjustments. A further advantage is that



the driver spring can be adjusted to deal with harder surfaces. This tool, produced by the fastening equipment division of the *Burgess Co., Inc.*, 2200 Scranton Road, Cleveland, is ruggedly constructed for heavy and long wear.

Acid, Alkali, Fire Proof Dye

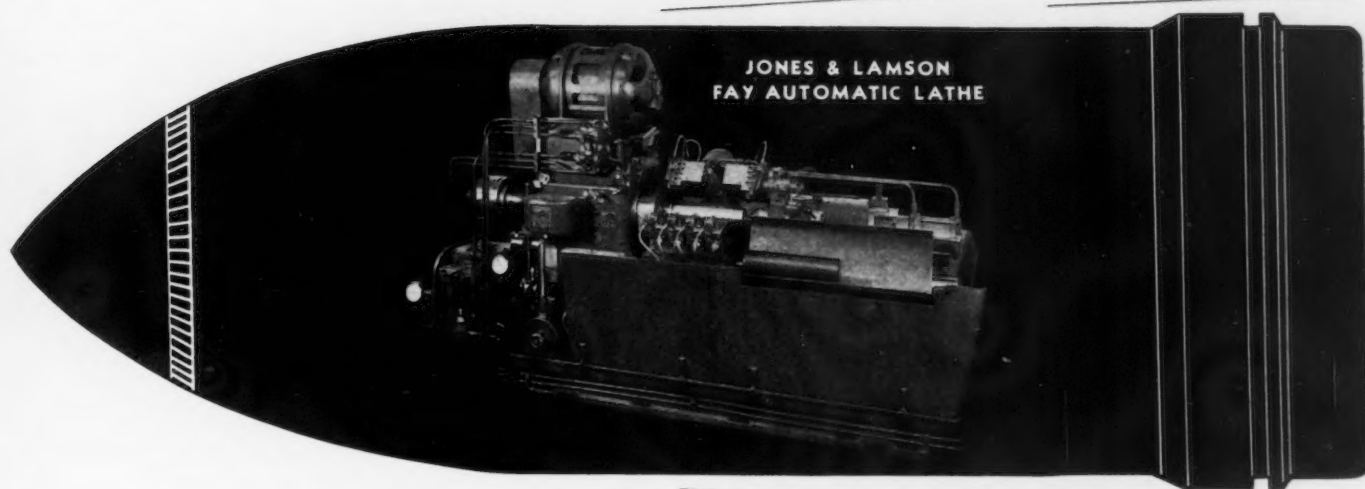
GREY, brown, red and green are the colors in which an improved dye for concrete floors, the Colorflex, is made by *Flexrock Co.*, 2300 Manning St., Philadelphia. This material is claimed to resist both strong solutions of acid and alkali, retaining color, polish and gloss. Only the blue constituent in the green is somewhat attacked by a strong alkali solution.

Miniature Respirator

A RESPIRATOR for nose breathing is a good protection against nuisance dust. This Dupor No. 1 respirator product of *H. S. Cover*, South Bend, Ind., weighs only 1 oz. and is made of soft, pliable rubber. The small, easily exchangeable filter is folded as to provide 9 sq. in. of filtration area.

Speed

BEHIND THE FIRING LINE!!



This is a national emergency, but your new Jones & Lamson equipment will earn peace-time profits later

Because they can be changed rapidly from job to job, Fay Automatic Lathes have established their ability to earn welcome profits on highly competitive peace-time work. In the automotive field, for example, the same Fay Automatic Lathes continue to handle a multitude of pieces that would otherwise require new special machinery every year.

Because of their proven adaptability, Fay Automatic Lathes will also obviate the need of special machinery for many of your defense assignments. What is more, you can look forward with greater confidence to a return to normal conditions when you know your standard Fay Automatics can continue to pay you profits in the face of post-war competition.

PROFIT PRODUCING



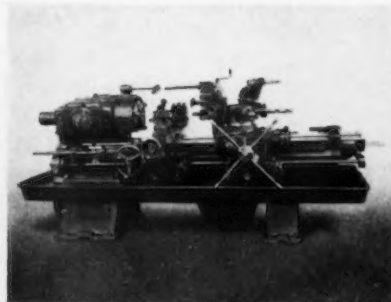
MACHINE TOOLS

JONES & LAMSON MACHINE CO.

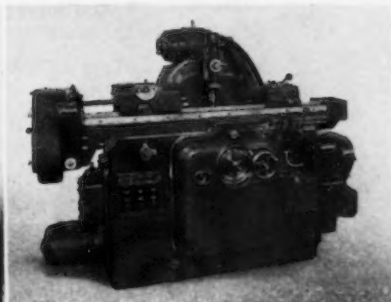
SPRINGFIELD, VERMONT, U.S.A.

Manufactures of Saddle & Ram Type Universal Turret Lathes . . .
Fay Automatic Lathes . . . Automatic Double-End Milling &
Centering Machines . . . Automatic Thread Grinding Machines
. . . Comparators . . . Tangent and Radial, Stationary and Revolving
Dies and Chases

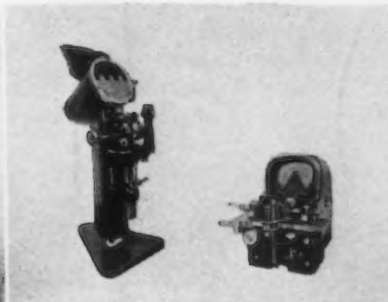
RAM & SADDLE TYPE
UNIVERSAL TURRET LATHES



AUTOMATIC THREAD GRINDERS



OPTICAL COMPARATORS



AUTOMATIC OPENING
DIE HEADS



DETROIT—A proposal for three model "seasons" in each model year was voiced last week before the Detroit Section of the Society of Automotive Engineers by one of the originators of modern styling technique for automobiles. He suggested different color schemes for each of the three seasons, with emphasis on two-tone and even three-tone color jobs as the model year progresses.

Back in 1923, when the auto industry was making its first attempts to get away from the idea that the customer could have "any color, so long as it is black," the first color advisory service was organized by Capt. H. Ledyard Towle, working with Du Pont. About four years later General Motors inaugurated its "art and color section," which ultimately became a combined body design and color service for the entire corporation. The founder the advisory service for Du Pont, and later the assistant department head—under Harley Earl—in GM was Capt. Towle. Now the director of advertising and creative design for the Pittsburgh Plate Glass Co., he is definitely the dean of color stylists of America in the industrial field. It is he who now suggests the three seasons.

Less Close Harmony—More Contrast Suggested

His proposal on the new approach to merchandising of automobiles is likely to be given some serious thought, since model changes must necessarily take second place in manufacturers' plans while the defense program is being carried out. Towle couched his suggestions in these terms:

"When the new cars are announced the public is interested mostly in price, improved performance and engineering gadgets, coupled with the new silhouette (if any)," he said. "Color at that time is not so important." This interest in the new models prevails for at least four months, he asserted, at which time the public has become accustomed to the new cars and "has achieved a fair degree of 'front-end recognition' and an acquaintance with the 'over-all silhouette.'" He suggested that at this time the industry begin to introduce two tones of the same color, or two closely related colors. This, he said, would revive the interest of thousands of drivers and pedestrians and this technique would be good for another four months of the model year.

About the time when talk of the next year's models became predominant and people are beginning to think that perhaps they ought to wait until the new cars come out in the fall, "then let us begin to throw

On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Varying color schemes for each of three seasons in each model year suggested to Detroit chapter of SAE... Material shortages reported in automotive center... Working with new materials brings new problems.

forward passes with color and to produce more color schemes, using less close harmony and more contrast," Towle suggested.

If, in the absence of major changes, the automobile industry is forced to make use of minor things to whet public desire for new cars, Towle's suggestion is available for their action.

Incidentally, the color expert voiced sharp disagreement with the way the two-tone color jobs are being offered now. He said that colors were being put on "upside down" and he cited experiments made 15 years ago to prove that the light color should be on the body proper and the dark color on the roof and rear quarter panels. The current practice of using the light color on the top part of the body is dia-

metrically opposed to principles demonstrated on General Motors Proving Grounds in 1926, Capt. Towle said. The objective in using the two-tone coloring is principally the attainment of an apparent length of the whole vehicle. By this means a car which already looks long, can be made to seem even longer. The proper method for doing this is to use the light color on the long main section of the body, cowl and hood.

Restrictions on automobile production because of defense requirements for materials and men are being spoken of more openly these days, although no one knows enough about the future to predict just what will happen. Automobile dealers have been warned privately and also by speakers at the National Automobile Dealers Association convention that there probably will be a loss of new car sales and production some time in the future. Howard V. Clark, sales manager of the sheet division of Carnegie-Illinois Steel Corp., declares that manufacturers have enough steel on hand now to carry them through their May and June production. Filling of additional orders will depend entirely upon decisions of government priority boards, he said.

Material Shortage a Problem of the Near Future

Dealers are already trying to figure a way to save their business should the worst happen. Among plans they are considering are special efforts to build up their service departments, to preserve this money-making side of the business and also to take proper care of automobiles that will be driven many extra miles when replacement with new cars cannot be made.

Actual instances of material shortage are cropping up every day now. One steel maker has reported that shortage of alloy elements has caused difficulty in

FEED THOSE GUNS

HERE'S HOW

European manufacturers, in their scramble for preparedness, quickly sought accepted American mass production manufacturing methods which for years they had avoided. Then our own defense program took up the methods of shell manufacture developed for the European countries. Through these methods it is possible to produce thousands of shells per day by means of numerous collective installations.

Mult-Au-Matics have been and are today outstanding in their manufacture of many sizes of shell bodies from 37 m/m to 155 m/m.

MULT-AU-MATICS are still available for relatively prompt delivery. Take advantage of this situation and immediately contact our engineers for Mult-Au-Matic deliveries and manufacturing data on your jobs.

BULLARD

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BRIDGEPORT, CONNECTICUT

maintaining steel production. First it was impossible to get aluminum, even in the small quantities required. When that shortage was cleared up, nickel became "tight," almost without any explanation. Mill schedules have had to be altered drastically during the period of these shortages. Recently a shortage of zinc has caused an interruption in the operations of some die casting plants supplying the automobile industry. To all appearances these shortages have been temporary; certainly they have not yet affected automobile production, but the threat exists in a very real form.

Word has been passed around that stainless trim, chromium plate and zinc die castings are among the materials likely to be eliminated on next year's cars or replaced by substitutes.

A program to study ways of freeing strategic metals for defense needs has been launched by Monsanto Chemical Co., according to Thomas F. Carswell, director of plastic research. Plastics will probably gain considerable impetus for automotive application as a secondary effect of the defense program. Already widely applied in automobile decorative uses, they may see wider application for moldings, instrument boards, etc. There is said to be no possibility of any shortage of either plastic compounds or the raw materials from which they are made. Nothing, however, has been said about fabricating facilities which might have to be expanded a lot to take care of growing needs.

The refrigerator industry has seen a much wider application of plastics to replace large areas of thin gage aluminum and steel. Several 1941 lines of refrigerators make use of molded plastics for freezer doors, panels and drawer fronts and as knobs and control panels.

The outlook for the plastic car is not as good as newspapers would indicate. Concentrated effort is being put into the program for the manufacture of a single plastic car by the Ford Motor Co., but it is understood that the program is one laid out to cover at least two or three more years of research.

Of the 92 elements, it is surprising how many of the precious and unusual ones are used in automobiles. This was proved recently

when Ford prepared a list of such materials used on the Ford cars. The specific use of each of these materials is indicated in the list.

Ruthenium—alloyed with platinum in contact points for regulators.

Iridium—alloyed with platinum in contact points for gages.

Rhodium—alloyed with platinum in contact points in regulators.

Palladium—alloyed with silver in contact points in regulators.

Platinum—alloyed with iridium and rhodium in contact points.

Gold—used in infra-red heat lamps to dry body enamel.

Silver—alloyed with cadmium in connecting rod bearings; also alloyed with copper, nichel or palladium in contact points.

Tungsten—used as steel alloy in valve inserts; also as pure metal in ignition and horn contact points.

Molybdenum—used in alloy steel transmission and differential gears.

Nickel—used in alloy steel transmission gears; also in stainless steel trim and nickel plating on bright metal parts.

Chromium—used in alloy steels in gears, springs and bearings; also in plating bright metal and stainless steel parts.

Cadmium—used in bearings, plated parts and red pigments.

Tin—used in bearings and solder.

Beryllium—used as copper alloy for hardening.

Tellurium—used as modifier in bearing babbitt.

Selenium—used in red tail-light glass and red pigments.

Antimony—used in lead alloys in battery.

Manganese—used in iron and steel alloys.

Cobalt—used in tools.

Vanadium—used in tools and dies.

The material situation is, of course, growing more stringent daily. It is now reported, for instance, that deliveries of duraluminum to Briggs for its aircraft work are being scheduled 38 weeks into the future. The material on order is being delivered on schedule, but there is no surplus, of course—this, despite the fact that Briggs production is still extremely low. In fact, Briggs has just delivered its first set of production

wings to the Vought-Sikorsky plant. These wings, it is understood, have been approved by the Navy following earlier approval of samples. With workmen still in need of practice which will give them skill, scrap losses are running high, although every conceivable measure is being applied to reduce scrap losses because the material is so difficult to obtain.

The problems of working with new materials like aluminum are important ones to the industry which is just "cutting its teeth" in aircraft and ordnance work. Some of the difficulties of working with aluminum alloy sheets were revealed a short time ago by K. T. Keller, president of Chrysler Corp. Mechanics not familiar with riveting of aluminum would assume that a row of rivets could be put in progressively, that is, one after another. However, Keller pointed out that the material stretches each time a rivet is set, so it is necessary to space rivets far apart along the joint to be riveted, and then go back and fill in the blank spaces with rivets. Individual holes must be drilled for each rivet, in turn, to assure alinement.

Suddenly brought face-to-face with problems of applying armor plate to tanks, technicians have learned some new things about these materials, too. "There are more kinds of armor plate than the ordinary man has appendages, counting fingers, thumbs and toes," is the colorful way that Keller described the problem. "Manufacturing of tanks has been predicated, we have learned, on the basis of 400 hours in carburizing furnaces to get 9/16 in. penetration." Chrysler engineers tackled that problem and finally brought the carburizing time down to 40 hr. They even succeeded in milling armor plate after they had been told that it could not be milled, only planed. A sample flown into Detroit last fall was successfully milled—13 cuts, each a quarter inch deep, with an average cutting speed of 60 ft. per min.—without damage to the cutting tools.

Automobile production continues at the unseasonally high level established during January. Output during the week ended Feb. 7 totaled 125,000 cars and trucks compared with 124,000 in the previous week and 95,985 in the corresponding week of last year, according to Ward's Reports.

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completion of facilities
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MORE STEEL

HIGH SPEED *construction* is as important to the iron and steel industry today as high speed *production*.

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Under such circumstances the services of Arthur G. McKee & Company become more valuable to you than ever before.

For many years McKee men have worked together as an organization. The coordination of effort born of this long experience enables us to take advantage of all short cuts in construction time.

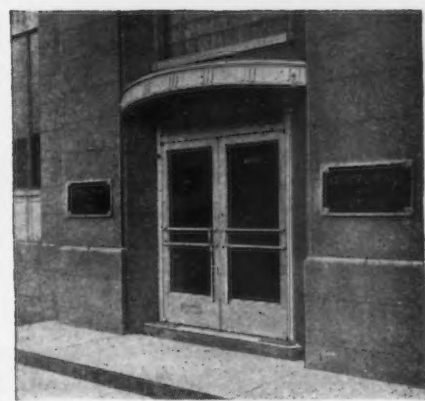
Each phase of engineering and construction progresses smoothly within *one* organization.

The McKee Method places undivided responsibility on this organization. This method not only produces more efficient and more economical construction, but results in completion earlier than by any other method.

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Entrance of the new McKee Building at 2300 Chester Avenue, Cleveland, Ohio.

This modern, fireproof building, containing 34,000 square feet of floor space is completely air-conditioned for winter and summer... Designed to create ideal working conditions, it is spacious and unusually well lighted.

The modern facilities and conditions provided in our new headquarters place us in a position to serve you more efficiently than ever before.



WASHINGTON — That sharp tax boosts are near at hand is a foregone conclusion. Actual preparation of a bill—the first bill—will await analysis of 1940 income returns to be reported by March 15. From them will be determined the amount of revenue to be derived from the two tax laws enacted last year.

At present about \$1,000,000,000 is the rough figure that it is estimated will be the amount of revenue raised from the initial bill that will be drafted. Obviously this is only the beginning toward payment of the enormous defense costs. Hence there will be one if not more defense tax measures, and the introduction of another before the expiration of the current year would occasion no surprise.

These taxes will be superimposed on money to be borrowed to aid in financing defense, in which is included aid to Great Britain. Defense borrowing is contemplated for at least the next year or two. Though the vast defense orders will stimulate business and income, and this means increased tax revenue, higher tax rates are definitely going to be assessed. One reason assigned is to checkmate undue defense profits. Another purpose is designed to speed up defense output by hitting at the pocketbook of the consumer.

He will be called upon to funnel more of his increased earnings from greater employment directly into the Federal treasury rather than buying civilian goods whose production would mean undue sacrifice of defense capacity. The Administration continues to oppose a federal sales tax on consumer goods, claiming it would be too much of a burden on low income groups. Nevertheless if pressure for consumption curtailment becomes as great as many think it will, predictions are that resort will be made to a sales tax.

But in any case individual and corporate income taxes will carry the heaviest increased costs. That is in line with the "ability to pay" formula and they are always collectible.

British Rates Much Higher

Increase of the normal corporation income rate appears to be quite probable. The present maximum levy is 24 per cent. That this rate will be lifted to 28 or even 30 per cent is being prophesied with proportionate increases in the lower brackets. Depending on yields, it is forecast that still higher taxes may be levied later.

Those who think this should be done attempt to show that, when related to British taxes, they will remain comparatively light. Existing British taxes



• Sharp tax boosts inevitable as defense costs mount . . . Preparation of first bill will await analysis of 1940 income returns . . . Corporation rate may reach 30 per cent with further increases depending on yields.

on corporations and individuals provide for a minimum payment of almost 43 per cent of income, irrespective of the amount of the income.

Rises in the excess profits tax rates, to apply to 1941 incomes, promise to be applied chiefly to the lower brackets, yet hiking of the present maximum rate of 50 per cent is said to be receiving a great deal of consideration by some groups both in the Administration and in Congress, who perhaps at this time reflect only minor influence. Here again those who want to bear down further point out that in Britain the excess profits tax, which is added to the standard rate, is 100 per cent in excess of standard profits, whose minima may be \$4000 or, in instances, \$12,000 on av-

erage profits over a period of years. Administrative provisions also are likely to be made in new tax legislation to net greater revenue.

Higher excess profits taxes not only are in the cards but, even more important, the Treasury will strongly press efforts to have these taxes assessed exclusively on invested capital, thus striking out the prevailing option of fixing a tax on a four-year period. Industry is strongly opposed to the elimination of this option.

Stiff opposition likely will be made to the Treasury plan but the view here is that if not altogether successful the Treasury will be at least partially triumphant in its advocacy of the change because it likely will break down considerable resistance by proposing special treatment for personal service corporations and businesses with small fixed capital.

Increases Due For Individuals

Even those who have been politically shy about doing so, agree that both normal and surtax rates on individual incomes are scheduled for increases, if not this year, at a later date, probably in 1942. These increases, from present indications, may go to 5 or 6 per cent from the present normal rate of 4 per cent plus 10 per cent of that for "defense" purposes. The higher surtax rates may be left undisturbed for the present but the lower ones may be changed to ensnare incomes of \$3000 or even less, thus catching many who are not now subject to surtaxes.

Despite efforts of the past few years of business interests and investors for liberalization of them, the direction is toward tightening capital gains taxes, or at least extension of the present provisions. Tax-exempt Federal securities also are going to be a thing of the past, without affecting outstanding issues. It is claimed that any ill effect on the bond market will be



HOW TO *Economically* GRIND SMALL LOTS ON A CENTERLESS



CONTRARY to common belief, CINCINNATI Centerless Grinders are as well suited to grinding small lots as any other type of machine. One shop reports that their quantities run from 25 to 500 pieces. For quantities like this, the margin of profit depends upon the observance of a few basic production principles. Want to know the two main ones?

First, group the parts according to thru-feed and infeed. It takes less time to change the set-up from one thru-feed job to another than

to change from thru-feed to in-feed and vice versa. Second, arrange the parts in order of declining diameters, starting with the largest. In this manner, *set-up time may be reduced to as low as 15 minutes.*

The complete story is contained in a circular entitled "Centerless for Small Lots", publication No. G-472. You may obtain a copy of it, with a machine catalog (G-456 for the No. 2 Centerless and G-438 for the No. 3 Centerless) by writing to the address given below.



CINCINNATI GRINDERS INCORPORATED

CINCINNATI, OHIO, U. S. A.

more than offset by increased revenue and by making commercial investments more attractive.

Washington

••• There is ground for the belief that relatively few of the approximately 1500 national and regional trade associations that were found to have been active in 1938 have in recent years engaged in collusive restraint of trade, according to a 500-page TNEC monograph that has just been published. Known as Monograph No. 18, it is the most comprehensive summary of the trade association movement that has yet been made. The study of the movement was prepared by Charles Albert Pearce of the Department of Commerce and a staff of experts under the general direction of Dr. Willard L. Thorp. Copies of the monograph are available at 50c. each from the Superintendent of Documents, Government Printing Office, Washington.

"Hoarding of Aluminum" Studied at Washington

Washington

••• The aluminum and magnesium priority committee of the Division of Priorities said last week that it had discussed broad problems concerning the production and utilization of aluminum but it failed to disclose the results of these discussions.

Under scrutiny, the committee announced, are difficulties caused by "the hoarding of aluminum," the extent to which plastics might take the place of aluminum, and the possibilities for using different grades of the metal in some non-defense manufacturing processes.

What was described as "a temporary tight situation" in aluminum was attributed to "the artificial scarcity caused by the hoarding of scrap." The committee said that scrap is actually more plentiful than would appear but that it is being withheld from the market. The committee's statement on aluminum follows the threat of

"drastic" action against aluminum scrap "hoarders" made two weeks ago by the Price Stabilization Committee of the National Defense Advisory Commission.

Other questions receiving the close attention of the committee include needs of the armed forces of this country and of Great Britain, and the requirements of those companies which are producing items indirectly intended for defense purposes.

New Export Control Office in New York

Washington

••• As an additional source of information and as an aid to manufacturers and exporters in the New York area, Administrator of Export Control Russell L. Maxwell announces the opening of a New York office at 602 Federal Office Building. The New York office will also collect and transmit pertinent information to Colonel Maxwell, but applications for export licenses will continue to be filed with the State Department's division of controls in Washington.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



Navy Turns Over Tungsten Ore to Steel Plants

Washington

••• To overcome a temporary shortage of tungsten and permit steel plants to continue with certain defense contracts, the Navy plans to turn over to the steel industry 226 tons of tungsten ore, which constitutes the total reserve stock accumulated under the Navy's critical materials purchasing program. The transfer consists of schellite ore having an estimated value of \$428,000.

Aircraft Engine Parts Plant for Cleveland

Washington

••• The President and the National Defense Advisory Commission have approved plans for construction of a new plant by the Thompson Aircraft Products Co. in the vicinity of Euclid, Ohio, at an estimated cost of \$11,198,472 for the manufacture of parts for aircraft engines, the War Department has announced.

EASY TO SELECT . . .

For
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or Brass, Bronze, etc.
STANDARD TOOLS ARE
ALUMINUM
COLORED

For
**STEEL
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STANDARD TOOLS ARE
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For 80% OF ALL TURNING, FACING, BORING JOBS

For simplified carbide grade selection and instant identification Carboloy STANDARD tools for STEEL cutting are copper colored and, for cast iron, brass, etc. aluminum colored.

Designed for "universal" use on 80% of all turning, boring and facing applications Carboloy standard tools comprise but five styles in three grades—grade 78-B for general purpose use on steel, grades 44-A and 883 (for extra long life in rigid machines) on cast iron, etc.

These new standards are easy to

select and easy to use. Each tool comes to you ground and ready for use. Chip breaking, too, has been simplified. Each steel cutting tool, styles 4, 7, 13 and 14, is supplied with a "universal" chip breaker already ground in. With each tool is packed a vest-pocket size operators' instruction booklet with complete, condensed operating and maintenance data.

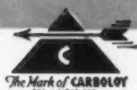
For wider, more profitable use, maximum economy, easy ordering, simplified stocks and FAST deliveries—use Carboloy STANDARD tools. Write for catalog GT-125.

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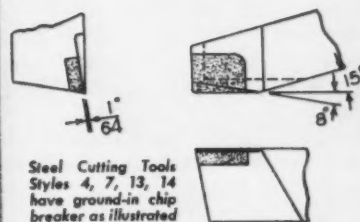
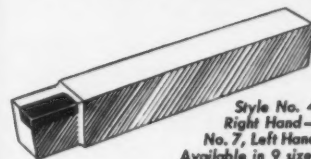
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STANDARD TOOLS



Look for this triangular trade mark on tools you buy. It is your assurance of genuine Carboloy cemented carbide.

CARBOLOY STANDARD TOOLS For "Universal" Use



Fatigue Cracks

BY A.H.DIX

Tiny Steps for Miles and Miles

• • • From a press release sent out by a manufacturer of gage blocks:

"The standard set shown contains 81 blocks with which combinations may be built up from 0.200 of an inch up to 12,000 miles in steps of .0001 of an inch."

Tapered slightly, no doubt, to allow for curvature of the earth.

Candidates for Oblivion

• • • Three things we are wildly enthusiastic about are (1) headlines beginning "So You're Going to . . .," (2) headlines ending with ". . . in the Modern Manner," and (3) Borden's cow Elsie. We hope the first two get pensioned and the third gets anthrax.

All Wrong But Us

• • • In his latest book, *Paris Gazette*, Lion Feuchtwanger, tells a story about a rabbi who was called upon to settle a dispute. After hearing the party of the first part, he said "You're right." The party of the second part then presented his case and was told "You're right." Both of them said, "But we can't both be right," to which the rabbi answered "That's right."

It doesn't make sense but neither does the fact that every trade paper, including your favorite family journal, regards itself as the best in its particular field. While this *Gott mit uns* attitude is a tribute to the mind's ability to convince itself that the cause with which it is associated is the only right one, it is confusing to advertisers. In the course of listening to a half dozen salesmen each swear solemnly and sincerely that his particular publication is best, the advertiser runs the risk of acquiring a passion for the truth. If this passion exceeds the yield point, he does the obvious thing of asking you and his other customers what publication you prefer.

We saw the results of such a survey the other day and are happy to report that your favorite family journal broke the tape as usual and as follows:

The Iron Age	57 votes
Second publication	24 "
Third publication	22 "

Rueful Ruminator

• • • The train that carries a member of the brains department to his daily toil passes Jersey City's Roosevelt Stadium. The other morning, after reading a particularly lugubrious editorial on the state of the world, his gaze wandered out the car window and came to rest on the icicled scoreboard lettered "Today . . . vs. . . Tomorrow." "Ain't it," he remarked with sententious elegance, "the truth."

It All Comes Back to Us Now

• • • Some weeks ago a mild interest was expressed here in the difference between a *gilhooly* and a *wingding*, two terms used in automobile racing. A. W. Miller, one of this page's army of 18 more or less avid readers, was good enough to put the question up to Ab Jenkins, the famous racing driver and present mayor of Salt Lake City. Mr. Jenkins makes it all plain:

"They say 'Joe Dokes just took a gilhooly or went into a wingding,' meaning just everything all mixed up together, sort of a 'mulligan.' In other words, a gilhooly or wingding is more or less when you get into trouble all by

yourself, either caused by a bad track, over-steering, running a car faster than it can be controlled, or any number of things."

Well, that's that.

Constitution Keyholer

• • • Your favorite family journal's staff now boasts a real author, not merely an article author, but a genuine book author. She is Miss Jane Butzner, secretary to the managing and news editors. Her book, just published by the Columbia University Press, is entitled "Constitutional Chaff," \$2.25, 197 pages. It's your meat if you yearn to know what went on in the secret sessions of the constitutional convention between May 25 and Sept. 17, 1787.

Now that it's over we see no harm in admitting that a great many of the suggestions offered didn't make the grade. The constitution as finally adopted was, of course, a compromise and the book tells you who gave ground and how much.

Little Words with a Wallop

• • • We have just reread the 271 words that Lincoln uttered at Gettysburg and again marvel that so much can be done with words of one syllable. Actually 204 of them, or 75 per cent, are monosyllables.

But if it were written today almost any editor or copy chief would make a few changes in it. The word "proposition," in ". . . dedicated to the proposition that all men are created equal," would be marked "Too harsh. Try 'truth,' 'belief,' etc." And "that that," in ". . . gave their lives that that nation might live," would be marked "Better rephrase this."

Stoppers

Scarred but not scared—Placard in show window of a bombed London clothing shop.

Take the "Toll Bridges" Out of Your Power Distribution!—Hewitt Rubber Corp.

"Cracker Barrel Steel" Is Gone!—Joseph T. Ryerson & Son, Inc.

The "Fifth Columnist" of Metals . . . Rust—E. F. Houghton & Co.

A super-stopper was that Millers Falls Double-Life Hack Saw ad on pages 71-72 of last week's issue, with the saw's upper end die cut so that it stood out like a neon sign during a blackout.

Penult vs. Antepenult

"You are all wet on molybdenum. The correct pronunciation is mo-lyb-de-num. If you don't believe me, look it up. I have just checked with Century and I'm right."

—W. A. L.

Our Funk & Wagnalls gives mo-lyb'-de-num as the preferred pronunciation and we will look no further as we don't want to become confused. But our book does give you the right to use the other pronunciation if you want to run the risk of giving people the impression that you don't know that the right way to say it is simply *moly*, as in Raymond.

Puzzles

• • • Last week's spendthrift started out with \$17.50.

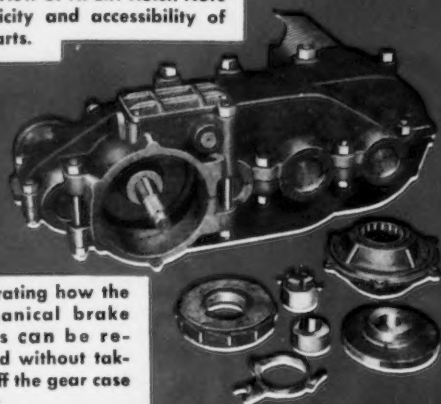
This one, from W. E. Voronovich of Orrville, Ohio, will put rings around your eyes:

A coal company appointed an agent, agreeing to pay him a salary of \$265 for six months, all the coal at the end of that time and all of the profits to belong to the company. The company furnished him with coal to the amount of \$825.60 and \$215 in cash. The agent received for coal sold \$1,323.40, paid \$937 for coal bought, paid sundry expenses authorized by the company \$129, paid his own salary \$265, paid to the company \$200, delivered to indigent persons by order of the company coal to the amount of \$13.50.

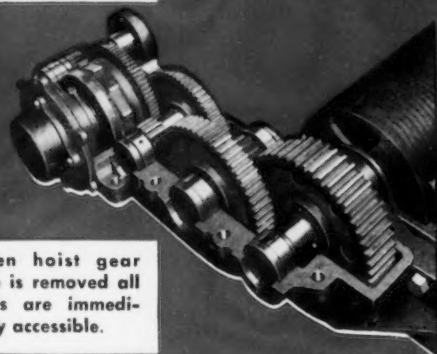
At the end of the six months the company took possession and found coal amounting to \$616.50. The agent then paid to the coal company the money belonging to them. How much did he pay? Did the company gain or lose by the agency and how much?



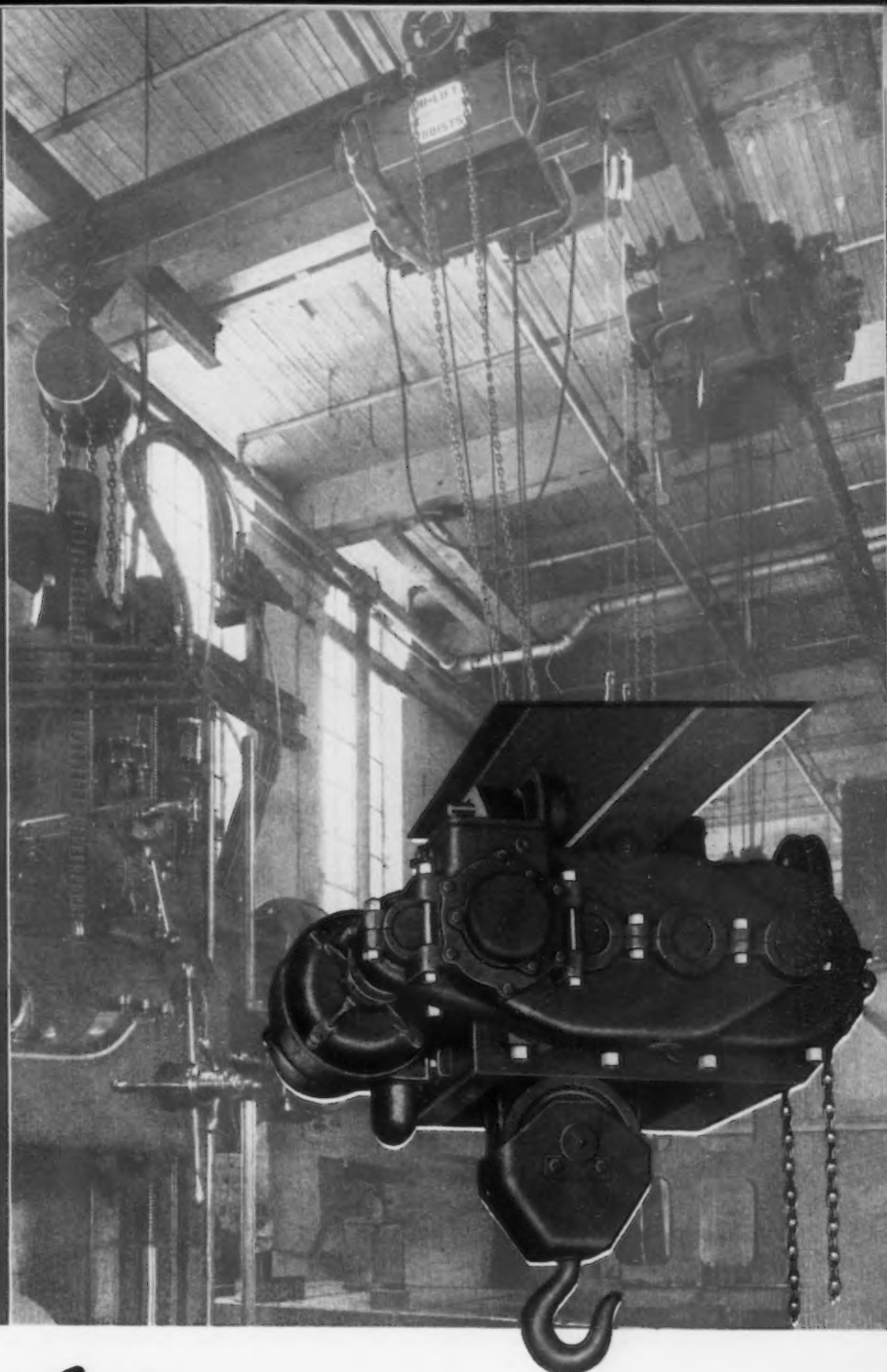
Plan view of Hi-Lift Hoist. Note simplicity and accessibility of all parts.



Illustrating how the mechanical brake parts can be removed without taking off the gear case cover.



When hoist gear case is removed all parts are immediately accessible.



BUY *Quality*
WHEN YOU BUY A HOIST

Northern
HI-LIFT

NORTHERN ENGINEERING WORKS
2607 Atwater St., DETROIT, MICHIGAN

Here is a hoist that will "stay put"—one that will give long, continuous service without becoming a service problem.

Extra quality put into Northern Hi-Lift Hoists costs but little more. But it pays out many times over in service, satisfaction, absence of failures and low repair costs.

Every part of the Northern Hi-Lift is built to take continuous hard service. It is the fine machine tool of electric hoists.

Built in capacities from 1000 pounds up to 20 tons. Types include one motor hoist with hand trolley, and motor travelled hoists for floor or cab control. Hoists are furnished to travel on straight track, or on tracks which include both curves and switches.

News of Industry...



Cuyahoga Valley Steel Mill, Cleveland, Ohio

Dayton Defense Equipment Survey Reveals 340 Idle Machine Tools

Dayton, Ohio

••• Much idle equipment of use for the defense program has been uncovered in a recent survey by the Business Research Department of the Dayton Chamber of Commerce. Around 340 machine tools and hundreds of small tools were found to be available.

Similar surveys being conducted in other large Ohio cities will yield valuable data to defense program authorities and to companies holding direct government contracts.

A survey of idle production capacity at Columbus, just completed by the research department of the Columbus Chamber of Commerce, reveals that Columbus plants are operating at slightly less than 50 per cent of their combined capacity, based on a 24-hour day as representing 100 per

cent capacity, according to Wilbur Bull, research director. More than 90 per cent of the companies replying said they would welcome defense orders, while some already holding defense contracts are looking for more work.

Among interesting aspects of the Dayton study is the volunteering of information by 20 companies which had not been sent questionnaires, some of them because their names were not known to the research bureau. These firms heard about the survey by word of mouth or through newspapers and asked to be added to the list, so that they are now in line to receive business.

According to Elwood E. Zimmer, director of the Dayton Chamber's business research department, the idea for the survey arose when a number of large industries com-

plained that apparently there were only a few places in Dayton where they could sub-contract a part of their direct defense contracts, thereby creating a bottleneck in production. At the same time, however, there were inquiries coming from small manufacturers who wanted to get into defense production.

"Here were two groups of people, one seeking to let work and the other seeking to receive work, who were unable to get together because they did not know each other," said Mr. Zimmer. "We thought if this were true of a few firms it might also be true of a great number of firms."

"Large holders of prime defense contracts in Dayton find it difficult to locate new plants to handle their farmed-out business because many smaller companies doing contract work are now loaded with prime as well as secondary contracts," Mr. Zimmer said.

The Dayton Chamber of Commerce decided to see if it could not

AID FOR ENGLAND: This photograph shows the unloading of one of the U. S. war planes now being sent in increasing numbers to British ports.

Photo by Harris Ewing

act as a co-ordinating agency, bringing together the larger firms and the smaller firms, so that they might do business in such a way that all would be kept busy and that every bit of capacity in Dayton could be utilized.

Of 200 questionnaires mailed, 88 were returned and 20 additional firms requested an opportunity to list their machinery and equipment.

"It was found in the course of the survey that there were a number of small tool and die shops which had capacity, equipment and labor but were idle because they could not handle large defense contracts and were unable to find people to whom they could go to gather sub-contracts of defense work," said Mr. Zimmer.

"The survey also uncovered a number of machines which were for sale, or lease, or for rent, which can be and probably will be put to use in Dayton's new enlarged vocational training school. One of the best results of the survey is that the information is now available to aid a situation which may become more acute as time goes along and the information will then be available immediately if the need arises."

"Breaking down the results into broad classifications, the following equipment was found to be available:

Lathes	92
Drill presses	66
Milling machines	49
Punch presses	34
Screw machines	31
Shavers	27
Grinding Machines	9
Radial drills	9
Planers	9

"Beyond this there are hundreds of small tools which go to complement the above machines in a metal working shop or tool shop and there are firms who answered the questionnaires who are engaged in the plating business, metal stamping and embossing work, and others who can be utilized in a



Coming Events

- Feb. 12 to 14—American Management Association, annual personnel conference, Chicago.
- Feb. 27 to 28—American Hot Dip Galvanizers Association, annual meeting, Pittsburgh.
- March 4 to 5—American Society for Testing Materials, spring meeting, Washington, D. C.
- March 13 to 14—Society of Automotive Engineers, national aeronautic meeting, Washington, D. C.
- March 25 to 29—American Society of Tool Engineers, Machine and Tool Progress Exhibit, Detroit.
- April 16 to 18—Electrochemical Society, Inc., spring meeting, Cleveland.
- April 23 to 25—Concrete Reinforcing Steel Institute, annual meeting, Hot Springs, Va.
- May 5 to 7—American Gear Manufacturers Association, annual convention, Hot Springs, Va.

dire emergency to manufacture parts with which they are not now acquainted or familiar," said Mr. Zimmer.

"As a result of the above survey we have had here many inquiries from some of our larger manufacturers concerning the names of these firms and the type of work which they can do. Our policy is to invite the interested parties to consult the list and the questionnaires which contain not only the name and address of the firm but also the type of equipment which he has. Then it is up to them to decide if any of the parties can do their work, having the proper equipment and the proper personnel. It is then up to them to select their own names and then to follow them out and to make with them their own contract and other

provisions necessary to getting the job done.

"It is very probable that quite a number of small firms are already getting work as a result of this survey and will probably continue to receive more as time goes along and the situation becomes more grave. This same information has been sent to the National Defense Commission along with a list of the names of the various firms who have signified to us their willingness to produce under a farming out program as much defense production work as they possibly can," Mr. Zimmer said.

At Columbus, a majority of the industries replying to the survey of 300 companies said that the chief reason their plants are not approaching 100 per cent capacity production is that orders in sufficient volume to justify increased production have not been forthcoming. Production can be stepped up in proportion to the increase in volume of orders, the other obstacles being of less importance, according to the firms' own analyses of their plant possibilities.

Lack of skilled workers was listed by a few as being a handicap in seeking defense work, while a very small number said that lack of proper equipment and inability to obtain needed materials prevent their increasing production at this time. Only two per cent reported that a shortage of capital is a serious obstacle to increased production. Results of the Columbus survey are being turned over to the National Defense Commission.

New Chicago Plane Engine Plants to Need 14,000 Men

Chicago

• • • The erection of two new aircraft engine plants in this area by the Buick division of General Motors and the Studebaker Corp. will require 14,000 men and will add more than 25,000,000 a year to the area's annual payroll.

Three builders have already announced plans to erect close to 1000 medium priced homes on three plots totaling 280 acres near the Buick plant. One builder has plans under way for construction of more than 500 homes in the vicinity of the Studebaker plant.

NLRB Finally Gets A Housecleaning

Washington

• • • Housecleaning of the National Labor Relations Board, which was attempted in a small way by board member W. M. Leiserson but turned out to be ineffectual in the face of opposition, has been put into operation within recent weeks under the direction of its new chairman, Dr. Harry S. Millis. The change, expected to improve and speed up the NLRB's operations, decentralizes the duties of the executive secretary, reduces by 50 per cent the personnel of the review division, which is given less latitude, and vests greater authority in a new administrative division headed by Garnett L. Patterson, veteran employee of the board and former regional director in Chicago.

Changes in the board's procedure were forecast even before the special House committee was designated to investigate its activities over a year ago. Revelations made by that committee, together with complaints from business of unfair treatment at the hands of board representatives and dissatisfaction expressed by the AFL, are generally credited with having put the NLRB functions in a light that made the housecleaning inevitable.

The operations of the office of executive secretary, recently vacated by Nathan Witt, have not only been decentralized but the office has been relegated to the background in importance so that its functions are henceforth to be of a purely routine nature.

The review division, which has been the object of much criticism ever since it was established because of the preponderance of young and inexperienced law school graduates, will alter its methods of reviewing the records of hearings so that greater responsibility will be placed on the older and more experienced trial examiners. Hence, the review attorneys will be given less latitude and will hereafter make written memoranda which board members can compare with data supplied by the trial examiners.

The new administrative division under the direction of Mr. Patterson will be directly responsible to

the board. It will supervise the work of the 22 regional offices and will direct the issuance of complaints and authorization of proceedings in representation cases. Under Mr. Patterson will be a regional coordinator, whose functions had previously been handled by the office of executive secretary, and three or four administrative examiners who will handle case development in Washington.

The new procedure has been quietly inaugurated in recent weeks, board representatives preferring to maintain silence on the changes. Some officials have insisted that the changes could not be properly de-





BUILDERS OF SHIPS: These men witnessed the laying of the keel of a new 45,000-ton battleship at the Philadelphia Navy Yard. To complete the U. S. ship construction program, largest in its history, 281,000 additional workmen must be hired by November, 1942. Approximately a fourth of the new skilled workmen will be machinists, the others welders, ship fitters, sheet metal workers, electricians, calkers and chippers, painters, pipe fitters, carpenters and others (in that order).

Photo by Harris & Ewing

CIO Backs Higher Steel Wage Rate

• • • Current demand of organized labor for higher wages is described as "sound economics" in the current issue of *Economic Outlook*, a CIO publication. Pointing to the SWOC move for higher wages, the publication says that "the decline in percentage of income going to wages and salaries as the level of national income rises is one of the serious causes of depression." It continues:

"In the coming year the unit wage costs will go down even more in the steel industry, as in other industries. This is because when the steel industry is working at nearly full capacity, the unit wage costs are much lower than when industry operates at 40 to 50 per cent of capacity. In addition this decline in wage costs results in greatly increased profits, as shown by the 140 per cent rise in U. S. Steel's profits for the past year, creating a large margin of company income out of which substantial wage increases can be paid without price increases."

(The steel industry's return on its investment was 2.4 per cent from 1929 to 1938.)

scribed as constituting a reorganization. Rather, it was said, they should be characterized as "procedural refinements."

Irvin Heads Steel's Aid-To-Britain Drive

• • • Winthrop W. Aldrich, president of The British War Relief Society, has announced the appointment of William A. Irvin, former president of U. S. Steel Corp., as chairman of the Steel and Iron Division of the Commerce and Industry drive for funds to aid the victims of war in Great Britain.

G-E Centers Chicago Activities in New Building

• • • With the movement of personnel and equipment now completed, Chicago district activities of the General Electric Company and affiliated companies, formerly scattered in nine separate locations, are now housed in G-E's new \$1,500,000 building in Chicago. Occupying the offices are sales and engineering divisions of various General Electric departments: Carboly Co., Inc.; and R. Cooper, Jr., Inc. (G-E distributor); General Electric Contracts Corp.; General Electric Supply Corp., and Locke Insulator Co.

Chicago Ordnance Staff Moved to New Office

Chicago

• • • Offices of the army's Chicago Ordnance staff will be moved to larger quarters in First National Bank building this month. Expansion of the staff has made the move necessary. The staff is now comprised of 40 army officers and 160 civil employees.

Toledo Industry to Need 7500 More Men

Toledo, Ohio

••• Business now in sight for 1941 in Toledo will mean jobs for 7500 to 10,000 additional persons, reliable sources here told THE IRON AGE recently. Toledo has around 50 plants working on defense contracts and much indirect work is being done in connection with the national program. Toledo Shipbuilding Co., which has been employing around 600 men on lake vessel repair jobs, recently received the first government award which it is believed will be followed by others, recruiting the war-time activity of the yards here in 1917-19 when many ships were turned out. The working force of the shipbuilding company will be greatly enlarged if prospects materialize. It will take several months to get started, however.

Toledo Scale Co. and Champion Spark Plug Co. are building additions to their factories. Willys-Overland is equipping vacant plants with machinery for about \$20,000,000 of army and navy ordnance work.

Willys-Overland reached a peak in 1928 when it had 23,500 employees. It will probably never again employ that many even with its automobile truck business plus its separate munitions set-up. But it will take on a lot of mechanics this year and now is advertising for certain types of skilled men.

Forging operations on recoil parts and breech housings for guns are scheduled to start at Willys-Overland Motors, Inc., this week and it is expected machining operations will start about Feb. 15. The company has received a commitment for a loan of \$1,700,000 from the Reconstruction Finance Corp. for special machinery and equipment for the ordnance work.

More than 1000 factory men are training in defense courses at University of Toledo and more than 500 more in high school vocational courses. These are snapped up as fast as they get through the courses.

Standard Oil Co. of Ohio has a \$500,000 tank storage construction project under way at its refinery here on the East Bayshore. The addition of 400,000 barrels of stor-

age capacity will bring the total storage facilities to 1,000,000 barrels of crude at the refinery. The work will be completed by May 1.

The Doehler Die Casting Co., now busy with a large volume of defense orders, has purchased a three-acre tract near its plant here for eventual expansion. The company enlarged the plant last year.

A temporary shortage of zinc caused an interruption in the operations of some Toledo die-casting plants recently.

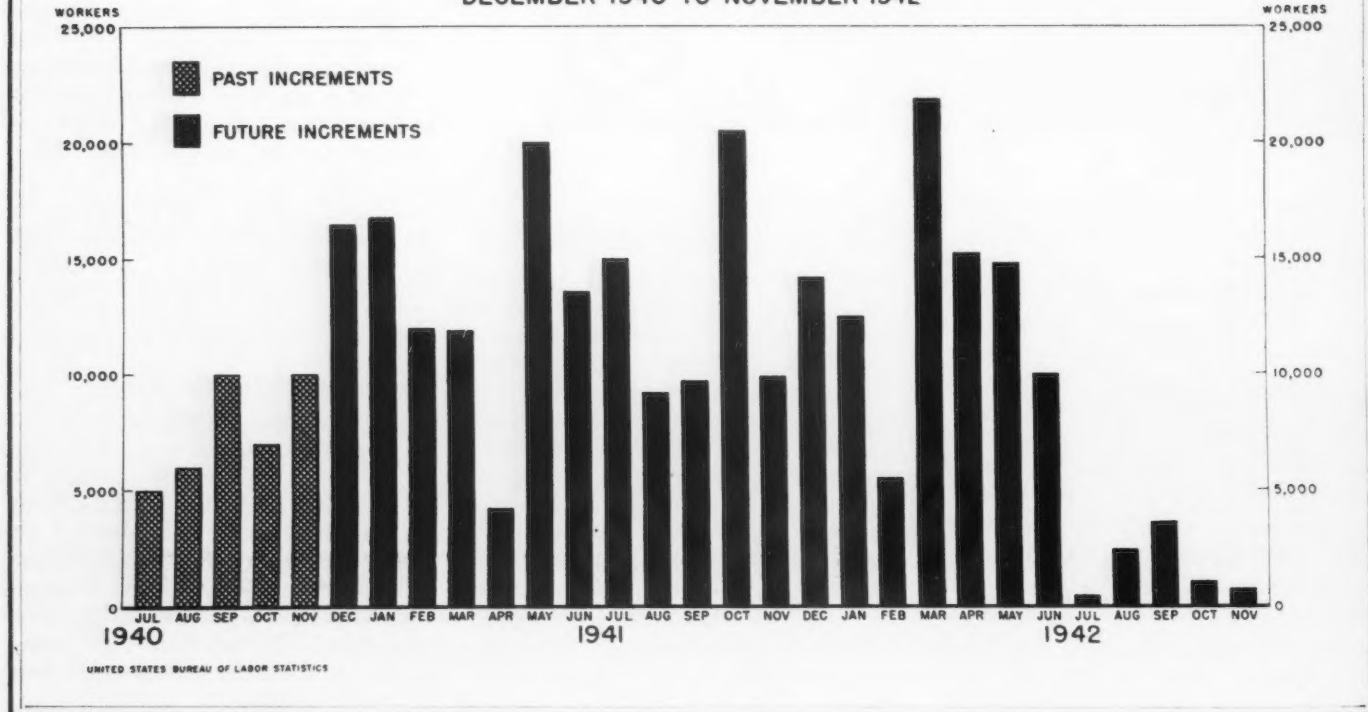
Auto Sales Total 3,415,905 in 1940

Detroit

••• Total retail sales of 3,415,905 passenger cars in the United States in 1940 are shown in the final tabulation of official registration figures by R. L. Polk & Co. This exceeds the 1939 registration figures of 2,653,337 by 28.74 per cent. Truck registrations show a gain of 18.40 per cent and total 576,327 compared with 486,748 in 1939.

NEW WORKERS NEEDED EACH MONTH IN SHIPYARDS ON CONSTRUCTION OF U.S. GOVERNMENT VESSELS

DECEMBER 1940 TO NOVEMBER 1942



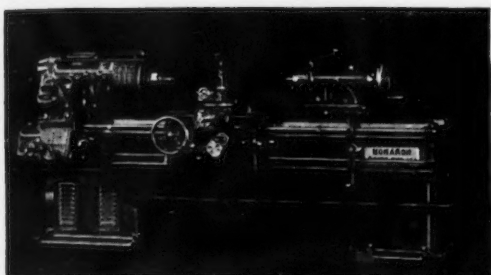


MONARCH LATHES

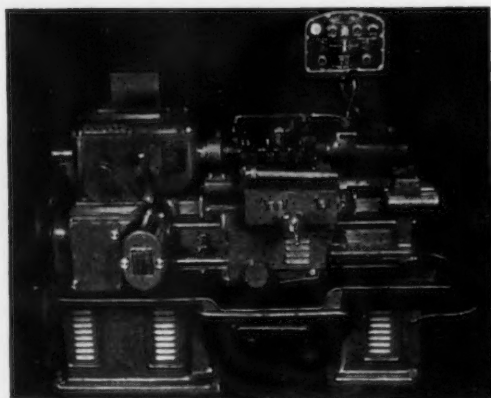


Monarch ~~Automatic Lathes~~ makes an automatic machine out of any size engine or tool room lathe.

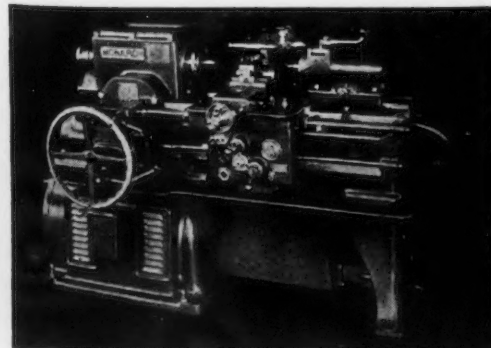
COVER THE TURNING FIELD



Monarch Model "C" Tool Room Lathes—available in 12", 14", 16", 18" and 20" sizes.



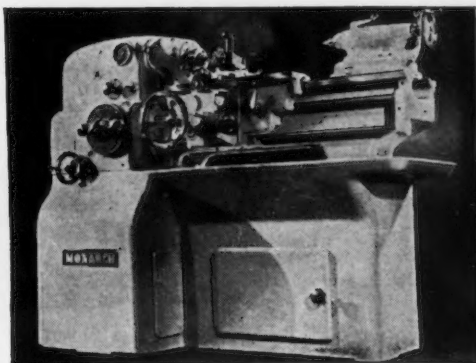
Monarch *Magne-Matic* Lathe — performs functions of many machines—is today's most universal automatic lathe.



Monarch 5-T Manufacturing Lathe—handles a variety of manufacturing jobs or a single quantity production job.

MORE and more, one name comes quickly to mind when you think of lathes—the last word in lathes—MONARCH. It is the symbol of progress, of technical advancement, of forward thinking. If a job is to be turned, it is likely that one of the many sizes and types of Monarch lathes will do the job better, faster, and at lower cost per piece. Monarch engineers can bring to your turning problems a wealth of experience gained during 31 years of broadening the scope of lathe production. The Monarch Machine Tool Company, Sidney, Ohio, U. S. A.

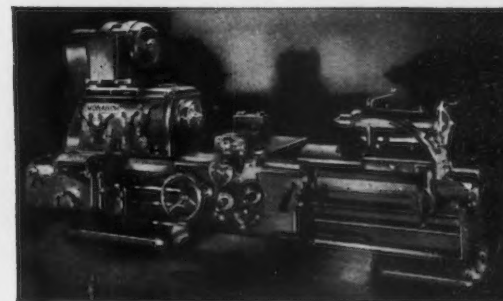
*"Expansion Time" Lathes By Monarch
Will Do Tomorrow's Competitive Job.*



10" Sensitive Precision Lathe—this 2,000-pound, 3 H. P. lathe fills a long-felt want in the Tool Room.



Monarch-Keller—For form turning, boring and facing. Incorporates many advancements which make it the most universal machine ever engineered.



Monarch Engine Lathes—available in these sizes: 12", 14", 16", 18", 20", 22", 24", 27", 30" and 36".

M O N A R C H L A T H E S

Chicago Sales Office: 622 W. Washington Blvd.; Indianapolis Sales Office: 3115 North Meridian Street; Newark Sales Office: 1060 Broad Street; Pittsburgh Sales Office: 604 Chamber of Commerce Bldg.

GOVERNMENT AWARDS

Government Awards

Government awards during the week ended Feb. 1, 1941, as listed by the Public Contracts Division, Department of Labor, follow:

Iron and Steel Products...\$7,757,429

American Car & Foundry Co., New York; stretcher wts.	\$58,145
American Cast Iron Pipe Co., San Francisco; cast iron pipe	14,600
American Chain Div. of American Chain & Cable Co., Inc., York, Pa.; chain	16,862
American Chain & Cable Co., Inc., Page Steel & Wire Div., Monessen, Pa.; chain link fencing ..	12,864
American Hoist & Derrick Co., St. Paul; shackles, clamps	10,109
American Rolling Mill Co., Middletown, Ohio; sheet steel	54,890
American Shim Steel Co., New Kensington, Pa.; steel	13,903
The American Steel & Wire Co. of N. J., Columbus, Ohio; cable ..	60,027
American Steel & Wire Co. of N. J., Washington; wire netting ..	12,411
Apollo Steel Co., Apollo, Pa.; sheet steel	22,954
Apollo Steel Co., Apollo; sheet steel ..	14,077
Babcock & Wilcox Tube Co., Beaver Falls, Pa.; tubing	12,401
Balfour Guthrie & Co., Ltd., San Francisco; pig iron	19,949
Barrett Equip. Co., St. Louis; brake refiners	25,584
Bethlehem Steel Co., San Francisco; rail bars	12,419
Bethlehem Steel Co., San Francisco; sheet steel	14,042
Bethlehem Steel Co., Bethlehem, Pa.; buoys	84,984
Bethlehem Steel Co., Bethlehem; tool steel	95,379
Bliss & Laughlin, Inc., Buffalo; steel	32,141
Campbell Foundry Co., Harrison, N. J.; castings	15,592
Capitol Steel & Iron Co., Oklahoma City; structural steel	11,445
Carnegie-Illinois Steel Corp., Washington; steel, plates	10,799
Carnegie-Illinois Steel Corp., Washington; bar steel	47,058
Carnegie-Illinois Steel Corp., Washington; sheet steel	18,968
Carolina Steel & Iron Co., Greensboro, N. C.; gates, bulkhead frames	47,961
Copperweld Steel Co., Glassport, Pa.; reinforcing fabric	224,625
Crane Co., Norfolk, Va.; valves ..	42,935
Crane Co., Chicago; valves	23,799
Crucible Steel Co. of America, New York; steel bar	15,428
Crucible Steel Co. of America, New York; bar steel	14,160
Crucible Steel Co. of America, New York; bar steel	26,772
Dayton Type, Inc., Dayton, Ohio; stand assys.	47,034
Dzus Fastener Co., Inc., Babylon, N. Y.; fasteners	16,033
Dzus Fastener Co., Inc., Babylon; fasteners	11,750
The Eastern Rolling Mill Co., Baltimore; ammunition	1,960,000
The Eastern Rolling Mill Co., Baltimore; sheet steel	15,260
Elite Specialty Metal Co., Inc., New York; buckles	26,980
Empire Machinery & Supply Corp., Norfolk, Va.; sockets	11,550
The Fairmount Tool & Forging Co., Cleveland; wrenches	14,677
Foran Foundry & Mfg. Co., Flemington, N. J.; castings	15,519
The General Fireproofing Co., San Francisco; shelving	38,972
Gifford-Wood Co., Hudson, N. Y.; boxes, steel	31,590

Globe Machine & Stamping Co., Cleveland; trays	26,000
Greene-Wolf Co., Inc., Brooklyn; valves	11,994
Greenville Steel Car Co., Greenville, Pa.; buoys	425,085
Harrisburg Steel Corp., Harrisburg, Pa.; cylinders	41,717
Herring Hall Marvin Safe Co., Hamilton, Ohio; yokes, rings ..	52,945
Hindley Mfg. Co., Valley Falls, R. I.; cotter pins, etc.	11,248
Hunter Pressed Steel Co., Lansdale, Pa.; clamps	10,685
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.; bearings	21,445
Indestro Mfg. Corp., Chicago; wrenches	11,914
Indianapolis Stove Co., Indianapolis; stoves	18,907
Kennedy-Van Saun Mfg. & Eng. Corp., Danville, Pa.; baseplates ..	12,067
Kilby Steel Co., Inc., Anniston, Ala.; clamps	54,090
Kline Iron & Metal Co., Columbus, S. C.; structural steel	24,125
Koppers Co., American Hammered Piston Ring Div., Baltimore; piston rings	16,361
Charles Kurzon, Inc., New York; locks	16,200
Leathem Smith Coal & Shipbuilding Co., Sturgeon Bay, Wis.; hull and fittings	600,000
Logan Elec. Specialty Mfg. Co., Chicago; clamps	60,000
Lukens Steel Co., Coatesville, Pa.; steel plate	34,221
Lukens Steel Co., Coatesville; housing, forging	76,620
Mack-International Motor Truck Corp., Long Island City, N. Y.; dump chassis	15,780
Maine Steel, Inc., South Portland, Me.; shackles, clamps	174,883
Michigan Steel Casting Co., Detroit; tube couplings	15,023
The Midvale Co., Washington; nickel steel	35,136
Midland Structural Steel Co., Cicero, Ill.; structural steel ..	48,840
Mill Factor Products Co., New York; reamers	11,236
Moto-Scot Mfg. Co., Chicago; rods ..	122,500
Mueller Co., Chattanooga, Tenn.; gates and stands	15,012
Nashville Bridge Co., Nashville, Tenn.; structural steel	36,870
National Can Corp., New York; cans	60,376
National Tube Co., Washington; flasks	228,347
Noland Co., Inc., Washington; wrenches	10,409
Nye Tool & Machine Works, Chicago; dies	16,964
Pacific States Steel Corp., San Francisco; steel rivets	26,716
Pittsburgh Steel Co., Pittsburgh; iron tubing	41,488
Pittsburgh Steel Co., Pittsburgh; iron tubing	16,937
Pittsburgh Steel Co., Pittsburgh; seamless tubing	20,152
Pittsburgh Steel Co., Pittsburgh; tubing	21,704
Pressed Steel Tank Co., West Allis, Wis.; steel containers	14,320
Republic Steel Corp., Cleveland; iron roofing	16,099
Republic Steel Corp., Cleveland; blanks	420,771
Republic Steel Corp., Cleveland; iron	26,258

Republic Steel Corp., Massillon, Ohio; billets	23,058
Republic Steel Corp., Massillon, Ohio; steel	227,852
John A. Roebbling's Sons Co., Trenton, N. J.; jackstays	186,161
John A. Roebbling's Sons Co., Trenton; shackles, clamps	37,062
Roessing Mfg. Co., Pittsburgh; steel coils	61,973
Rotary Elec. Steel Co., Detroit; steel	30,107
Rustless Iron & Steel Corp., Baltimore; steel	104,211
Jos. T. Ryerson & Son, Inc., Cambridge, Mass.; bar and rod	10,183
Joseph T. Ryerson & Son, Inc., Cambridge; steel, sheets	23,477
Southern Pipe & Casing Co., Azusa, Cal.; pressure pipe	22,180
Southwest Welding & Mfg. Co., Alhambra, Cal.; buoys	12,440
Stacey Bros. Gas. Construc. Co., Cincinnati; gas holders	111,300
N. Stafford Co., Brooklyn; stencils and shields	18,608
Standard Pressed Steel Co., Jenkintown, Pa.; cores	179,599
Sterling Steel Casting Co., St. Louis; steel castings	19,601
Summerill Tubing Co., Bridgeport, Pa.; tubing	62,524
Steel Conversion & Supply Co., Castle Shannon, Pa.; chisel blanks	11,900
Union Boiler & Mfg. Co., Lebanon, Pa.; buoys	18,600
Union Twist Drill Co., Athol, Mass.; hobs	14,774
United Aircraft Products, Inc., Dayton, Ohio; rod end, etc.	11,527
U. S. Steel Export Co., Washington; structural steel	121,925
Vincennes Steel Corp., Vincennes, Ind.; structural steel	12,024
Walton East Branch Foundry Corp., Walton, N. Y.; castings ..	15,282
Walworth Co., New York; valves ..	30,161
Western Pipe & Steel Co. of Calif., Los Angeles; buoys	54,348
Wire Rope Corp. of America, Inc., New Haven, Conn.; wire rope ..	13,248
Wolverine Pressed Steel Co., Grand Haven, Mich.; handles	17,094
Worden-Allen Co., Milwaukee, Wis.; gates and bulkhead frames ..	16,850
The Yale & Towne Mfg. Co., Stamford, Conn.; locks and keys ..	32,572
Youngstown Sheet & Tube Co., Youngstown, Ohio; sheet steel..	29,898

Other Machinery\$16,184,731

Acme Machine Tool Co., Cincinnati; lathes	\$38,354
Aerial Machine & Tool Corp., New York; assemblies	40,320
Air Reduction Sales Co., New York; regulators	27,250
H. F. Allen Co., Inc., New York; grinding machs.	11,920
American Hoist & Derrick Co., St. Paul; crane	418,000
American Locomotive Co., New York; engine parts	10,779
American Transformer Co., Newark; filter unit	10,775
Atlas Car & Mfg. Co., Cleveland; locomotive	22,975
Atwater Mfg. Co., Plantsville, Conn.; fuze plugs	118,125
Automatic Temperature Control Co., Inc., Philadelphia; valves..	30,842
Barnard Aviation Equipment Co., Inc., Ashley, Pa.; pulleys	11,792
W. F. & John Barnes Co., Rockford, Ill.; drilling machine ..	23,591
Bay State Elevator Co., Inc., Springfield, Mass.; elevators ..	44,950
Bisholt Machine Co., Madison, Wis.; lathes	17,339
Bogue Elec. Co., Paterson, N. J.; motor generators	159,000

Cost

OF NATIONAL DEFENSE IS LESSENER BY BLUEPRINTS



because... DRAWINGS MUST BE
AND BLUE PRINTING REPRODUCED MANY TIMES
BEST AND LEAST EXPENSIVE METHOD
Some Reasons why the "22-16" produces
better Blueprints faster and at lower cost—

- ✓ **SLIDING CONTACT**—smoothes out all inequalities present in all tracings— $2\frac{3}{4}$ inches of uninterrupted exposure area in the Model "22" Printer—more than is possible with a 12-inch cylinder. Polished Trans-Peco glass passes 20% more Actinic rays.
- ✓ **ACTINIC ARC LAMPS**—give unequalled uniformity of light emission—burn for 45 minutes without even breaking the arc and then resume instantaneously—There are 4 Actinic Arc Lamps in the 42" and 5 in the 54" Model "22" Printer.
- ✓ **THREE SPEED LAMP CONTROL**—10, 15 or 20 amperes as desired, avoiding frequent Dryer heat changes—the mechanical operating speed remains the same, and the lamp amperage varies according to the tracing being reproduced.
- ✓ **HORIZONTAL WATER WASH**—floats the exposed paper horizontally without tension thus averting wrinkles—bleeding practically eliminated. Tanks are rust resistant copper.
- ✓ **QUICK CHANGE CHEMICAL APPLICATOR SYSTEM**—from Blueprints to negatives in thirty seconds and vice versa—the only method of applying polish to one side and hypo to both sides of the paper. Very economical.
- ✓ **8" ALUMINUM DRYING DRUMS**—Either Gas or Electrically Heated. 5 in the Model "16" Washer and Dryer—gradual drying automatically without distortion—"flat as hung wallpaper."
- ✓ **SPEED, QUALITY AND LOW COST**—Blueprints at 15 feet per minute with the Model "22-16"—uniform, contrasty prints with clean-cut, sharp lines—exceptionally low cost per square foot.

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"22-16"**

OK. *Chief Engineer*
**U. S. A.
INDUSTRIAL
PLANTS**

THE C. F. PEASE COMPANY
2695 West Irving Park Road • • • Chicago, Illinois


GOVERNMENT AWARDS

Bucyrus-Erie Co., South Milwaukee; crane	60,275
Bucyrus-Monighan Co., Chicago; excavator	44,040
Buda Co., Washington; generator sets	421,680
Buda Co., Harvey, Ill.; Diesel eng. pts.	121,280
Bullard Co., Bridgeport, Conn.; mills	109,513
C. F. Bulotti Mach. Co., San Francisco; lathes	10,473
Jabez Burns & Sons, Inc., New York; coffee roasting unit	10,343
Carey Mach. & Supply Co. of Baltimore City, Baltimore; lathes	21,988
Caterpillar Tractor Co., Peoria, Ill.; tractors	239,324
Chicago Pneumatic Tool Co., New York; air compressor	19,069
Chicago Pneumatic Tool Co., Philadelphia; drills and borers	16,959
Chicago Pneumatic Tool Co., Philadelphia; drills, grinders, wrenches	13,438
Chicago Pneumatic Tool Co., Philadelphia; drills, grinders	22,473
Chicago Pneumatic Tool Co., Philadelphia; drills	22,198
Cincinnati Bickford Tool Co., Cincinnati; drills	14,118
Cincinnati Gilbert Mach. Tool Co., Cincinnati; boring machine	28,650
Cincinnati Milling Mach. & Cincinnati Grinders, Inc., Cincinnati; milling machines	13,544
Cincinnati Milling Mach. & Cincinnati Grinders, Inc., Cincinnati; milling machs.	33,849
Cincinnati Shaper Co., Cincinnati; power press brakes	12,366

Cleveland Automatic Mach. Co., Cleveland; screw machs.	28,999
Cleveland Tractor Co., Cleveland; tractors	32,654
Colson Corp., Elyria, Ohio; hand trucks	10,026
Columbia Steel Co., San Francisco; anchors	341,850
Consolidated Shipbuilding Corp., New York; engine parts	14,341
C-O-Two Fire Equip. Co., Newark; transfer unit	15,045
Cowles Tool Co., Cleveland; cutters	17,436
Cuno Engineering Corp., New York; oil filter	11,347
M. T. Davidson Co., Brooklyn; pumps	17,761
De Laval Steam Turbine Co., Trenton, N. J.; pumps	19,104
Denison Engineering Co., Columbus, Ohio; test stand	425,000
Dixie Mill Supply Co., Inc., Shreveport, La.; lathes, grinders	18,712
Elec. Arc Cutting & Welding Co., Newark; generator	24,320
Engineering Products Co., Los Angeles; winches	20,280
Florence Pipe Foundry & Mach. Co., Philadelphia; bending mach.	10,512
Franklin Sales Co., Inc., Fort Myers, Fla.; mowers	11,627
Gardner-Denver Co., Washington; compressors, parts	13,917
General Electric Co., Schenectady; locomotives	19,879
General Elevator Co., Atlanta; elevator	10,291
General Motors Corp., Cleveland Diesel Engine Div., Cleveland; Diesel engine parts	17,998
General Steel Castings Corp., Eddy-	

stone, Pa.; anchors	96,612
Gisholt Machine Co., Madison, Wis.; balancing mach.	11,085
Gisholt Machine Co., Madison; lathes	18,143
Greenville Steel Car Co., Greenville, Pa.; railroad car	60,940
Haffner-Thrall Car Co., Chicago; railroad car	23,942
Louis Hanssen's Sons, Davenport, Iowa; jacks	38,520
Hardinge Bros., Inc., Elmira, N. Y.; milling machine	10,058
Industrial Brownhoist Corp., Bay City, Mich.; crane	508,960
Ingersoll-Rand Co., New York; pneumatic hammers	50,877
Ingersoll-Rand Co., Washington; compressor parts	29,088
Ingersoll-Rand Co., Washington; compressors	160,560
Insinger Machine Co., Philadelphia; dishwashing machs.	35,609
International Harvester Co., Inc., Washington; tractors	29,841
Iron & Steel Prod., Inc., Chicago; baggage cars	17,430
Walter Kidde & Co., Inc., New York; cylinders	10,350
Lakeside Bridge & Steel Co., Milwaukee; crane	129,150
Leece-Neville Co., Cleveland; diesel eng. pts.	18,369
Lees-Bradner Co., Cleveland; milling machs.	35,530
Leland-Gifford Co., Worcester, Mass.; drilling machs.	46,880
R. G. LeTourneau, Inc., Peoria, Ill.; carryall, crane	74,416
Lidgerwood Mfg. Co., Elizabeth, N. J.; windlasses	28,889
Arthur D. Little, Cambridge, Mass.; distilling unit	22,000
Lloyd & Arms, Inc., Philadelphia; drills	23,218
Mahr Mfg. Co. (Div. of Diamond Iron Works, Inc.), Minneapolis; furnace	11,947
W. L. Maxson Corp., New York; fuze setters	14,000
Milton Equipment Co., Philadelphia; metal working machinery	13,800
Monarch Machine Tool Co., Sidney, Ohio; lathes	39,116
Moore Eastwood & Co., Dayton, Ohio; generators	94,341
National Acme Co., Cleveland; screw machs.	1,971,330
National Twist Drill & Tool Co., Detroit; drills	11,469
Niles-Bement-Pond Co., Pratt & Whitney Div., West Hartford; metal shapers	42,786
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford; reproducing machs.	41,715
Ohio Locomotive Crane Co., Bucyrus, Ohio; crane	20,420
Pacific Car & Foundry Co., Seattle; railroad cars	16,500
Pacific Marine Supply Co., Seattle; pumps	32,632
Peck, Stow & Wilcox Co., Southington, Conn.; metal working mach.	23,837
Philadelphia Gear Works, Inc., Philadelphia; speed reducers	71,688
Philips & Davies, Inc., Kenton, Ohio; gate hoists	140,000
Philips & Davies, Inc., Kenton; dogging devices	40,000
Pittsburgh Steel Foundry Corp., Glassport, Pa.; anchors	431,298
Pneumatic Scale Corp., Ltd., Norfolk Down, Mass.; labelers	15,120
H. K. Porter Co., Inc., New York; locomotives	68,850
H. K. Porter Co., Inc., Pittsburgh; locomotives	13,900
Henry Prentiss & Co., Inc., New York; lathes	60,048
Proctor & Schwartz, Inc., Philadelphia; machines	24,060


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Reed-Prentice Corp., Worcester, Mass.; lathes	25,630
Robbins & Myers, Inc., Hoist & Crane Div., Springfield, Ohio; hoists	11,952
Rockford Machine Tool Co., Rockford, Ill.; shapers	26,875
Rockford Machine Tool Co., Rockford; planer	12,942
Rockford Machine Tool Co., Rockford; slotter	19,413
St. Joe Machines, Inc., St. Joseph, Mich.; washing machs.	14,270
Samuel Machinery Co., Philadelphia; grinding mach.	12,500
Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.; winches ..	146,828
Scovill Mfg. Co., Waterbury, Conn.; fuze parts	4,231,240
Scovill Mfg. Co., Waterbury; primer assys.	87,904
Seneca Falls Machine Co., Seneca Falls, N. Y.; lathes	35,930
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.; hoist mechanisms	13,365
W. E. Shipley Machinery Co., Philadelphia; spindle mach.	20,205
A. O. Smith Corp., Milwaukee; converter vessels	131,130
Standard Steel Works, N. Kansas City; tank trailers, dollies..	941,554
Sterling Engine Co., Buffalo, N. Y.; generator	13,644
Tidewater Supply Co., Inc., Norfolk, Va.; milling machine ..	10,655
Triumph Mfg. Co., Chicago; galvanometer	26,880
H. B. Underwood Corp., Philadelphia; milling mach.	15,775

United Engineering & Foundry Co., Pittsburgh; forging press	1,972,182
Vulcan Iron Works Co., Denver; coining presses	19,415
Warner & Swasey Co., Cleveland; lathes	39,245
Wayne Tool Co., Waynesboro, Pa.; reamers	11,223
Worthington Pump & Mach. Corp., Washington; pumps	54,298
Yale & Towne Mfg. Co., Stamford, Conn.; pumps	191,688
York Corrugating Co., York, Pa.; metal working	16,836
York Ice Machinery Corp., Philadelphia; refrigerating plants ...	45,633
York Ice Machinery Corp., York, Pa.; low temperature chamber..	17,733
York Machinery & Supply Co., York, Pa.; lathes	35,752

Non-Ferrous Metals and Alloys\$2,449,067

Adams & Westlake Co., Elkhart, Ind.; lights, reflectors	\$11,713
Aluminum Co. of America, Pittsburgh; aluminum alloy	84,332
Aluminum Co. of America, Pittsburgh; conductor	635,367
Aluminum Co. of America, Washington; alloy	16,015
Aluminum Co. of America, Washington; aluminum alloy	13,787
American Brass Co., Waterbury, Conn.; bronze and copper	44,109
American Brass Co., Waterbury; brass tubing	29,651
American Metal Co., Ltd., New York; copper	108,700

American Smelting & Refining Co., Denver; copper	20,384
American Smelting & Refining Co., New York; lead	36,950
American Smelting & Refining Co., New York; zinc	15,540
Baltimore Div., Revere Copper & Brass, Inc., Baltimore; condenser tubes	50,347
Bohn Aluminum & Brass Corp., Detroit; aluminum alloy	91,757
Bridgeport Brass Co., Bridgeport, Conn.; copper pipes	12,552
Calumet & Hecla Consolidated Copper Co., New York; ingot copper ..	48,200
Chase Brass & Copper Co., Inc., Waterbury, Conn.; bands	43,652
Chase Brass & Copper Co., Inc., Waterbury; copper seamless tubing	14,806
Federated Metals Div., American Smelting & Refining Co., New York; bronze, manganese	138,354
Foster Wheeler Corp., New York; brass and copper pipe	114,956
General Time Instruments Corp., Thomaston, Conn.; clocks	131,175
International Nickel Co., Inc., New York; nickel-copper alloy	278,204
John P. Kelly, Philadelphia; bronze castings	10,500
Walter Kidde & Co., Inc., New York; fire extinguishers	258,636
Lewin Mathes Co., E. St. Louis, Ill.; copper tubing	16,040
North American Smelting Co., Philadelphia; anti-friction metal ..	31,036
Revere Copper & Brass, Inc., Baltimore Div., Baltimore; cartridge cups	167,976



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Revere Copper & Brass, Inc., Baltimore; welding rods 14,079

Navy Dept., Bureau of Supplies and Accounts:

Theo. Alteneder & Sons, Philadelphia; rules, rolling \$5,482
 Aluminum Goods Mfg. Co., Manitowoc, Wis.; platters, aluminum 6,120
 Aluminum Products Co., La Grange, Ill.; tureens, aluminum 6,040
 American-LaFrance Foamite Corp., Elmira, N. Y.; engine, fire 6,593
 The American Steel & Wire Co., Washington; cable, electric 8,366
 Anaconda Wire & Cable Co., New York; cable, multi-conductor .. 90,072
 Anaconda Wire & Cable Co., Washington; cable, electric 8,187
 Austin-Hastings Co., Inc., Cambridge, Mass.; shapers, motor .. 125,850
 Bendix Aviation Corp., Eclipse Aviation Div., Bendix, N. J.; starters, aircraft 452,520
 Bethlehem Steel Co., Bethlehem, Pa.; rails and fittings, railroad. 33,072
 N. J. Blanchard Boat Co., Seattle; boats, aircraft rescue 142,233
 The Blanchard Machine Co., Cambridge, Mass.; grinder, surface.. 7,889
 Bridgeport Brass Co., Bridgeport, Conn.; discs, brass 51,040
 Calumet & Hecla Consolidated Copper Co., New York; copper, ingot .. 54,225
 The Cincinnati Bickford Tool Co., Cincinnati; drills, upright 8,769
 The Cincinnati Shaper Co., Cincinnati; shapers, heavy duty 12,529
 Collyer Insulated Wire Co., Pawtucket, R. I.; cable, electric ... 8,189
 Columbia Steel & Shafting Co., Pittsburgh; steel, bar 21,647
 Consolidated Aircraft Corp., San Diego, Cal.; tank, dynamic 6,538
 Continental Motors Corp., Muskegon, Mich.; sets, generator 11,967
 The Cuyahoga Steel & Wire Co., Maple Heights, Cleveland; steel, bar 12,117
 The Emerson Elec. Mfg. Co., St. Louis; fans, electric 36,180
 Freeport Point Shipyards, Inc., Freeport, N. Y.; boats, aircraft. 226,296
 Gardner-Denver Co., Washington; cable, electric 7,560
 General Cable Corp., Washington; cable, electric 546,081
 General Electric Co., Schenectady; spares, major overhaul for reduction gear 7,062
 General Electric Co., Washington; cable, electric 7,084
 General Motors Corp., Detroit; trucks, motor 5,919
 General Motors Corp., Chev. Div., Detroit; trucks, fire and rescue. 98,930
 Gingras Boat Works, Inc., Cocoa, Fla.; boat, aircraft rescue 46,203
 Gould & Eberhardt, Newark; shapers, heavy and standard 51,549
 M. Greenberg's Sons, San Francisco; valves, globe 16,284
 C. Hager & Sons Hinge Mfg. Co., St. Louis; hinges, butt, marine; strap, brass 66,171
 The Hendey Machine Co., Torrington, Conn.; lathes, precision ... 11,848
 Inter-Coastal Paint Corp., San Leandro, Cal.; compound, metal conditioning 5,362
 International Harvester Co., Inc., Washington; trucks, motor 16,854
 The A. Lietz Co., San Francisco; circles, bearing 11,875
 Lloyd & Arms, Inc., Philadelphia; drills, radial 12,293
 Moore Machinery Co., San Francisco; machines, boring 15,636

Mystic Shipyard, Inc., West Mystic, Conn.; boat, aircraft rescue. 48,078
 National Electric Products Corp., Pittsburgh; cable, electric 7,416
 Niagara Machine & Tool Works, Buffalo; machines, shearing ... 17,748
 The Okonite Co., Passaic, N. J.; cable, electric 7,210
 The Okonite Co., Passaic; cable, multi-conductor 154,655
 Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford; drills, radial 16,776
 Rockford Machine Tool Co., Rockford, Ill.; shaper, openside, hydraulic 7,150
 Rockbestos Products Corp., New Haven, Conn.; cable, electric .. 7,276
 Snow Shipyards, Inc., Rockland, Me.; sweepers, mine, coastal .. 604,000
 South Coast Co., Newport Beach, Cal.; boats, aircraft 206,098
 Struthers Wells-Titusville Corp., Titusville, Pa.; forgings, steel.. 172,152
 Swind Machinery Co., Philadelphia; drills, radial 71,034
 The S. Weinstein Supply Co., New York; wrenches, engineers' 9,969
 Westinghouse Elec. & Mfg. Co., Washington; equipment, dynamometer 143,124
 Wheeler Shipyard, Inc., Brooklyn; boat, aircraft 52,128
 Worthington Pump & Machinery Corp., Washington; compressors, air 9,030

Ordnance Dept.:

American Brass Co., Waterbury, Conn.; small arms ammunition components \$676,854
 Arrow Tool & Reamer Co., Detroit; cutters 2,560
 Bliss Co., E. W., Brooklyn; presses 6,585
 Boston & Lockport Block Co., East Boston; tackle blocks 7,283
 Chase Brass & Copper Co., Inc., Waterbury, Conn.; small arms ammunition components 547,018
 Clinton E. Hobbs Co., Everett, Mass.; chain block 25,268
 Colonial Broach Co., Detroit; broach sections 2,102
 Fram Corp., East Providence; oil filters 4,907
 Hanson-Whitney Machine Co., Hartford; gages 30,531
 Jones & Lamson Machine Co., Springfield, Vt.; lathes 17,758
 Revere Brass & Copper Co., Baltimore; brass 789,770
 Taft-Peirce Mfg. Co., Woonsocket, R. I.; gages 1,865
 Youngstown Sheet & Tube Co., Youngstown, Ohio; steel 3,134

Quartermaster Corps:

Diamond T. Motor Car Co., Washington; trucks, 4-ton \$737,154
 Fargo Motor Co., Washington; trucks, 1/2-ton 13,354
 Ford Motor Co., Alexandria, Va.; cars, light 312,600
 General Motors Corp., Chev. Div., Washington; trucks, 1 1/2-ton ... 8,296,493
 General Motors Corp., Chevrolet Div., Washington; tractor-trucks and trucks 381,591
 Gramm Motor Truck Co., Delphos, Ohio; semi-trailers 56,934
 Lavine Gear Co., Milwaukee; trailers, 1-ton 703,500
 Mack Mfg. Corp., Long Island City, N. Y.; trucks, 2 1/2-ton, water tank 3,390
 Singer Sewing Machine Co., St. Louis; sewing machines 5,225

Watson Automotive Equipment Co., Washington; semi-trailers, 2-wheel 52,097
 Winter-Weiss, Denver; semi-trailers 71,460

Corps of Engineers:

American Blue Print Co., New York; drafting equipment \$30,989
 American Hoist & Derrick Co., St. Paul; locomotives 418,000
 Ames Baldwin Wyoming Co., Parkersburg, W. Va., and North Easton, Mass.; shovels 36,170
 The Buffalo Springfield Roller Co., Springfield, Ohio; rollers 34,825
 The Caterpillar Tractor Co., Peoria, Ill.; tractors 239,324
 County Supply Co., Plainfield, N. J.; drills 24,307
 Flour City Ornamental Iron Co., Minneapolis; firing reels 22,176
 Fruehauff Trailer Co., Kansas City; trailers 4,465
 General Cable Corp., Buffalo; copper wire 41,650
 Greenville Steel Car Co., Greenville, Pa.; box cars 60,940
 Haffner-Thrall Car Co., Chicago Heights; railroad cars 23,942
 R. G. LeTourneau, Inc., Peoria, Ill.; construction equipment ... 74,416
 MacLane Hardware Co., New York; tools 84,115
 The Mills-Morris Co., Washington; clippers and cutters 29,982
 The Mills-Morris Co., Washington; tools 48,139
 Natural Asphalt Co. of Va., Richmond, Va.; distributors 28,980
 The Ohio Locomotive Crane Co., Bucyrus, Ohio; locomotive cranes 20,420
 Triumph Mfg. Co., Chicago; galvanometers 26,880
 Vulcan Iron Works, Wilkes-Barre, Pa.; locomotives 205,000
 Walker Mfg. Co. of Wisconsin, Racine, Wis.; jacks 30,327
 J. H. Weil & Co., Philadelphia; computers 27,645

Air Corps:

Beach Aircraft Corp., Wichita, Kans.; airplanes, spare parts .. \$1,191,639
 Bendix Aviation Corp., Eclipse Aviation Div., Bendix, N. J.; Assys. 578,925
 Bendix Aviation Corp., Pioneer Instrument Div., Bendix, N. J.; assys. 308,000
 Boeing Aircraft Co., Seattle; armor plate protection 77,805
 The Denison Engineering Co., Columbus, Ohio; stand assys. 425,000
 Electric Wheel Co., Quincy, Ill.; trailers 74,500
 Goodyear Tire & Rubber Co., Akron, Ohio; wheel & brake assys. 923,504
 Walter Kidde & Co., Inc., New York; fire extinguishers 258,636
 Lights, Inc. & FitzZiebarth, Alhambra, Calif.; field lighting sets 613,605
 Lights, Inc., Alhambra, Calif.; sets 85,507
 Pollak Mfg. Co., Arlington, N. J.; assys. 33,250
 Pump Engineering Service Corp., Cleveland, fuel and vacuum pumps 2,929,793
 United Aircraft Corp., Hamilton Standard Propellers Div., East Hartford; propeller assys. 77,064
 Wesson Co., Detroit; drills 29,132
 Weston Electrical Instrument Corp., Newark; indicators 148,534
 Wright Aeronautical Corp., Paterson, N. J.; maintenance parts for Wright aeronautical engines ... 241,537

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THE IRON AGE, February 13, 1941—95

Road Program Seen After End of War

Washington

• • • A large-scale spend-lend program of public works, designed to absorb the shock when the defense emergency ends, is being planned by the Administration. Enabling legislation authorizing the con-

struction of highways, hospitals, airports and housing, may be asked at this session of Congress, although appropriations probably will not be sought until the post-war period.

This is the picture drawn last week at a White House press conference, at which President Roosevelt indicated that the program would be planned to provide some

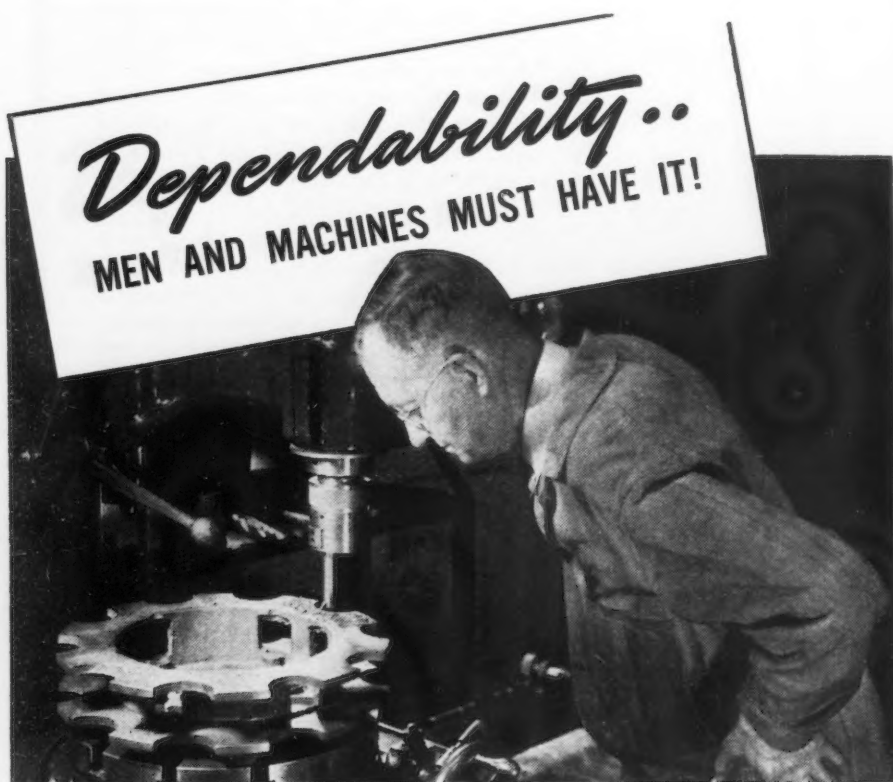
kind of return of capital to the government, and that initial emphasis would be placed on highway construction.

The President announced several months ago that he favored "filling the shelves full with future projects" to be built when private employment shows signs of lagging, although he was vague at that time. He recalled last week that after the first World War, the government adopted a policy of permitting completion of all defense armament contracts actually under way.

This, the President explained, permitted a gradual tapering of employment in the munitions industries and prevented more serious economic aftermaths that might have resulted from complete cessation of armament work. The projected public works program is calculated by Administration advisers to be even a more effective industrial shock absorber, despite the fact that the late public works effort failed to take up the post-depression slack in employment to the extent forecast by its government sponsors.

Mr. Roosevelt called it quite probable that provision will be made in the new program for a new trunk highway extending the whole length of the Atlantic Coast. Making reference to the highway construction program before conferring later in the day with Commissioner Thomas H. MacDonald of the Federal Bureau of Public Roads the Chief Executive said that uppermost in the minds of government representatives are the problems of military and civil needs in highway construction, and the subject of condemnation of rights-of-way.

On several previous occasions, the President has looked with favor upon the principle of excess condemnation—a process by which the government would take over more property than is actually needed for the highway proper and selling the excess after appreciation in value due to the highway development. Mr. Roosevelt casually mentioned excess condemnation at his conference last week, observing that the principle had been successfully applied in several states and had proved an effective means of paying off capital costs of highway development.



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O'Brian Counsel for Production Office

Washington

•••The Office of Production Management has named John Lord O'Brian, of Buffalo, as general counsel with the approval of President Roosevelt and Attorney General Robert H. Jackson.

Mr. Lord's most recent connection was special counsel for the constitutional case involving the Tennessee Valley Authority. He has severed his work with the Buffalo law firm of O'Brian, Hellings, Ulsh, & Morey to become OPM general counsel.

3000 Seeking Higher Pay, Stop Work at Wilmerding

Pittsburgh

•••More than 3000 CIO members staged an hour work stoppage at Westinghouse Air Brake Co., Wilmerding, Pa., late last week. According to the union, the protest was over the company's counter contract proposal, but works manager W. C. Landis stated "The union submitted a draft of the contract and we submitted counter proposals. Without any notice to us or without any reply to our proposals, the union caused an interruption of work."

The union is demanding 10c. an hour wage increase, a union shop, severance pay for draftees, and a sliding system of paid vacations. The company has had frequent meetings with the union and has indicated its willingness to sign a contract, according to company officials.

Porter Ships Locomotive To Tata Iron & Steel Co.

•••The H. K. Porter Co., Inc., Pittsburgh, has completed a new steam locomotive for use in the plant of the Tata Iron & Steel Co., Ltd., at Jamshedpur, India. The new equipment, designed for switching and general plant use, is the third of this type shipped recently to Jamshedpur by the Porter company. The Porter company, established in 1866, is this year celebrating its 75th anniversary.

Bullard Announces New Plant Expansion

•••Bullard Co. of Bridgeport, Conn., has awarded a contract for the construction of a large new machine tool assembly building to the Turner Construction Co. More than two acres of additional production space will be provided in the new structure which will be one-story in height and measure

180 x 500 ft. Designed by A. D. Crosett, it will be of structural steel frame construction. The site is on Blackrock Turnpike, Fairfield, Conn., adjoining the present plant of the Bullard Co.

The schedule calls for completion of the building on July 1, with provision for the beginning of equipment installation by the owner on June 1.



• That's what the boss in this plant said when one tank after another came from the big presses with its zinc coating in tip-top shape.

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Union Truce Called at Universal Cyclops Plant

Pittsburgh

• • • A 5-day outlaw strike involving 1400 employees at Universal Cyclops Steel Corp., Bridgeville, Pa., was settled last week under a truce effected by U. S. Department of Labor conciliator, Charles R. Ward. Pending grievances are to be adjusted within two weeks and wage demands which originally included a 25 per cent increase will be adjudicated. The strike, sponsored by the Amalgamated Association of Iron, Steel & Tin Workers, CIO affiliate, voted 284 to 123 to accept the peace terms. A \$4,000,000 defense order was held up during the strike.

Monarch Shipments \$7,137,375 For 1940

• • • The Monarch Machine Tool Co., Sidney, Ohio, showed a net profit for 1940, after all deductions including provision for federal income and excess profits taxes, of \$1,183,102 as compared to a net profit of \$529,577 for 1939, according to the company's annual report to shareholders. Shipments for the year totaled \$7,137,375, as compared to \$2,892,767 in 1939. Wendell E. Whipp, president, stated that production had been stepped up by increased employment, by operating the plant on a two-shift basis of 60 hr. each week, and by sub-contracting the largest possible amount of machine work to outside shops.

Fowler, Bergstrom Take Construction Posts

Washington

• • • Frederick Hall Fowler, of San Francisco, president of the American Society of Civil Engineers, has been named as chief of the Civil Engineering Unit of the Construction Division, Quartermaster General Corps, of the War Department.

George Edwin Bergstrom, of Los Angeles, president of the American Institute of Architects, has been designated chief of the Architectural Unit. Mr. Bergstrom, a native of Neenah, Wis., is the designer of several notable examples of architecture on the Pacific Coast.

Technologists Needed By the Government

••• The U. S. Civil Service Commission has announced open competitive examinations to secure technologists for national defense work. Difficulty is being experienced in filling positions in such branches of technology as explosives, fuels, plastics, rubber, minerals, and textiles. Persons qualified in these branches are particularly urged to file applications.

The positions to be filled are in several grades with salaries ranging from \$2000 to \$5600 a year. For the lowest grade, that of junior technologist in any specialized branch, applicants will be required to take a written general test. For the other grades, competitors will not have to take a written test but will be rated upon their education and experience.

More Ambulances Given to Britain

Detroit

••• The donation of three automobile ambulances to the British-American Ambulance Corps by the Detroit Chapter of the Institute of Scrap Iron and Steel has been announced. Along with the three ambulances a year's maintenance of each vehicle has been contributed. This action of the Detroit Chapter follows recent action by the institute nationally. However, the allocation of vehicles called for only one from Detroit and the additional two were decided upon by members of the Detroit Chapter.

Foote Bros. Refunds Its Preferred Stock

Chicago

••• With approximately \$9,000,000 in airplane gear orders on hand, plus a \$2,000,000 plant expansion, the Foote Bros. Gear & Machine Corp., has refunded its outstanding preferred stock. A registration statement filed with the Securities and Exchange Commission became effective on Jan. 30, covering 100,000 shares of new no-par 60 cent cumulative convertible preferred stock. The stock was sold on Feb. 3 at \$10.50 a share.

*you can't
dodge it*

Once he places his name on the completed unit, a manufacturer automatically "co-insures" every nut and bolt. No manufacturer has been able, successfully, to side-step or alibi the failure of an accessory. That's why the Twin Disc Clutch Company gives so much importance to the fact that "Twin Disc Clutches are built for the job they have to do—not merely to fit the machine of which they are a part."

The Twin Disc Clutch Company recognizes its dual responsibility . . . a responsibility to you as a machine builder . . . a responsibility to your customer.

For example: Conservative ratings are a safety factor that protects both the manufacturer and the user. For the manufacturer, conservative ratings, if followed, will eliminate costly service calls; for the user, they are added assurance of dependable performance. That's why Twin Disc Clutches are never over-rated.

This is but one of the ways in which the Twin Disc Clutch Company protects its customers. Why not let us tell you the whole story of Twin Disc "built-for-the-job" clutches?

Above: Machine Tool Clutch. Below: Heavy-Duty Clutch.

Above: Marine Reverse and Reduction Gear. Left: Power Take-off. Below: Torque Converter.

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CLUTCHES AND HYDRAULIC DRIVES
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TWIN DISC CLUTCH COMPANY, 1370 RACINE ST., RACINE, WIS.

West Coast Steel Men Hear Warning on Speculative Buying

Del Monte, Calif.

••• Determination of how California's iron and steel industry will handle its share of approximately three billion dollars worth of defense contracts already awarded on the Pacific Coast, and further defense work to come, formed the core of discussions at the 17th annual

conference of Iron, Steel and Allied Industries here last week.

Presenting the national steel picture to the delegates, John H. Van Deventer, president and editor of IRON AGE, said that any crowding of United States steel capacity could be largely attributed to inventory speculation.

"We could shut down every steel producing plant in this country for 10½ months during this year of 1941 and still fully meet the needs of our American defense program with a month and a half of operation," he said.

Mr. Van Deventer estimated that a maximum of 17 million tons would be required during 1941 for national defense requirements at home and aid to England and Canada, plus other exports. Pointing out that the domestic per capita consumption of steel does not rise in proportion to national income, he anticipated that American normal industrial requirements would fall short of 42 million tons of ingots. Comparing these figures with an expected capacity of 87 million tons by the end of the year, he demonstrated that defense requirements could be doubled and industrial consumption materially increased without overflowing capacity.

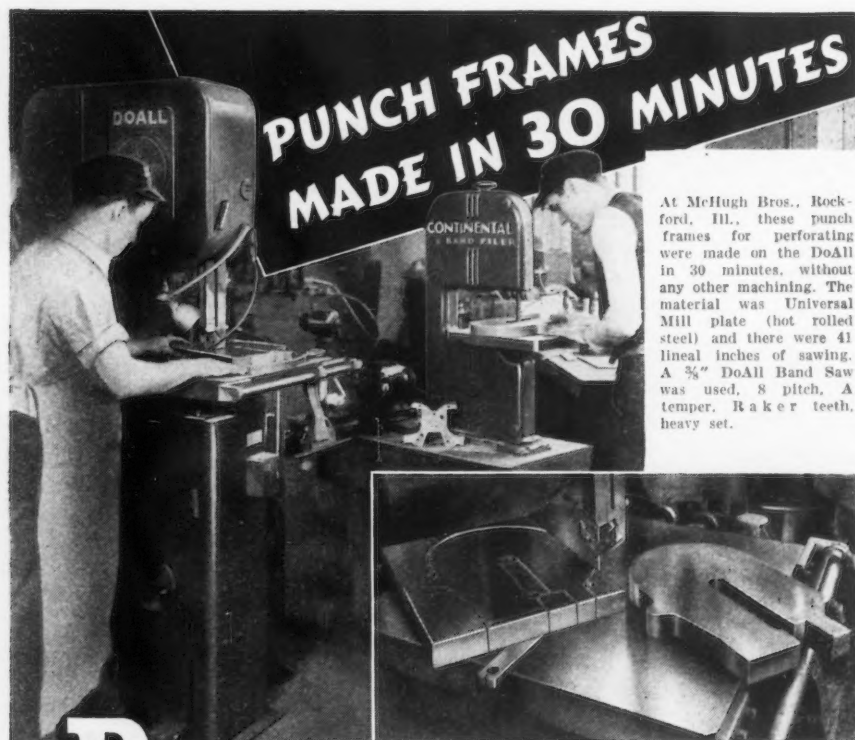
The editor explained current near capacity operation, stating, "The California gold rush of 1849 has been superseded by the great American steel rush of 1941. Tom, Dick, and Harry are stocking up."

"What can we do to save the steel industry from disastrous compulsory and unnecessary expansion of capacity? You have it right in your own hands. If you jobbers and mill sales executives, in this and other districts of our country will undertake to exercise your knowledge of needs to put thumbs down on speculative buying, the job is as good as done. And you will be doing a splendid and profitable job for yourselves as well as for your country and your industry."

E. C. Mausshardt, Pacific Coast district manager, United States Maritime Commission, revealed that the commission had placed orders with West Coast shipyards for 44 cargo vessels, at a contract price of \$113,692,020, as part of its long range shipbuilding program. These vessels will require more than 100,000 gross tons of steel, he said.

The West Coast's share in the emergency shipbuilding program, not to be confused with the above, will constitute 62 cargo vessels, to be part of the President's recently announced "bridge of ships."

"It is contemplated that 31 of these new emergency cargo vessels will be built by the California Ship-



At McHugh Bros., Rockford, Ill., these punch frames for perforating were made on the DoAll in 30 minutes, without any other machining. The material was Universal Mill plate (hot rolled steel) and there were 41 lineal inches of sawing. A ¾" DoAll Band Saw was used, 8 pitch, A temper, Raker teeth, heavy set.

DoAll ELIMINATES "BOTTLE NECKS"

In America's "full speed ahead" defense program, the DoAll is playing a major role in cutting corners and factory red-tape. It is the modern machine tool that does precision band sawing, and is replacing shaping, milling and lathe work with sensational savings of time, labor and material. A day's work in one hour—a two-hours' job in 15 minutes—these are now common experiences among DoAll users in metal working plants, machine shops, automotive and aeroplane plants, arsenals and shipyards, etc.

CONTINENTAL BAND FILER

Does continuous band filing, which means faster, better, smoother filing on all material from tough high-carbon steel to brass, wood, etc. 12 styles of file bands are available, ½", ¾" and 1" wide, flat, oval or half round.

Let us send a factory trained man to your plant to show you what a DoAll can save for you.

FREE—Literature or Handbook on Contour Machining, 158 pages of valuable metal working helps.

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DoAll GRINDER

A super precision surface grinder—a real production tool. Less vibration because motor is built right on the ball-bearing spindle. Work table has exceptionally large bearing surface. Hydraulic table travel is infinitely variable, up to 50 f.p.m.



building Co. at Los Angeles, and a similar number by the Oregon Shipbuilding Co., Portland, Ore. There is also a large shipbuilding plant being erected at Richmond, Cal., where 30 cargo ships will be built for British account," Mr. Mausshardt stated.

"The President has authorized the Maritime Commission to purchase facilities up to \$36,000,000 to be installed at the sites. The facilities will be government-owned with the land privately owned and the yards privately operated, as has been the case with facilities provided by the War and Navy Departments in certain circumstances under an arrangement developed by the National Defense Commission."

An eye-opener as to how rapidly the far West's other mushrooming defense industry, aircraft, has sprouted was provided by John E. Canady, public relations manager, Lockheed Aircraft Corp.

"Today the southern California aircraft industry alone employs some 90,000 men with a monthly payroll in excess of 13 million dollars, and has a backlog of unfinished business in excess of one and a quarter billion dollars," he stated. The personnel figure contrasts with 2000 men 10 years ago, and 20,000 men two years ago. Floor space in West Coast aircraft factories has trebled in the past year, he declared.

A. H. Young, California Institute of Technology professor and former United States Steel Corp. industrial relations director, told the conference that the American workman "has joined the union and insists on bargaining collectively through the union."

"If trade unionism is to be the medium of contact by which our employees insist they shall be represented in the councils of industry, then let us prove by our magnanimity, our sincerity and our reliance on the decency and nobility of those who are workmen only as they are in the shop, and who are our neighbors, associates and fellow citizens all of the time, that trade unionism is an agency of mutual benefit," Mr. Young said.

Elected chairman of the conference for the coming year was C. B. Tibbetts, Los Angeles Steel Casting Co., who succeeds B. J. Osborne,

Moore Dry Dock Co., Oakland. New vice-chairman is H. M. Tayler, Tayler & Spotswood, San Francisco. C. S. Knight, State Chamber of Commerce continues as secretary.

Members of the executive committee from the respective groups will be:

Steel plate fabricators: Duncan S. Neilson, Berkeley Steel Construction Co.; John W. Lucas, South-

west Welding & Mfg. Co., Alhambra; William G. Meagher, Independent Iron Works, Oakland; and R. A. Stumm, Southern Pipe & Casting Co., Azusa.

Reinforcing steel: C. M. Gunn, Gunn-Carle & Co., San Francisco; and W. A. Godshall, Blue Diamond Corp., Los Angeles.

Structural shops: P. F. Gillespie, Judson-Pacific Co., San Francisco;



EVEN in normal times metal finishing departments must operate on schedule . . . must avoid bottle necks. With new metals, new processes and new finishes entering the picture all the time, tough problems of metal cleaning are the order of the day.

Now, when all the emphasis

is on speed, bottle necks are serious. You can help to prevent trouble in your department by keeping in touch with your Wyandotte Service Representative. He is constantly on call for all kinds of metal cleaning help. A word to him today may prevent a bottle neck tomorrow. There is no obligation for his services.



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Alfred Neuffer, Bethlehem Steel Co., Los Angeles; Gale Herrick, Herrick Iron Works, Oakland; and C. E. Bradburn, Pacific Iron & Steel Co., Los Angeles.

Foundries: Charles P. Hoehn, Enterprise Engine & Foundry Co., San Francisco; Ivan Johnson, Pacific Steel Castings Co., Berkeley; C. B. Tibbetts; and J. B. Eppley, Kinney Iron Works, Vernon.

Manufacturers and purchasing

agents: H. W. Saunders, Air Reduction Sales Co., Oakland; and E. F. Watkins, Southern California Edison Co., Los Angeles.

Merchant steel: Hugh Oliphant, Tay-Holbrook Co., San Francisco; and O. E. Bean, Union Hardware & Metal Co., Los Angeles.

Mills: W. A. Ross, Columbia Steel Co., San Francisco; and W. H. Stewart, Bethlehem Steel Co., San Francisco.

50 Milwaukee Plants Form Machine Pool

Milwaukee

• • • Owners of about 50 small metal manufacturing plants in this area have organized a pool in the effort to place idle machines in production, according to a plan presented to the city's defense construction committee. Mark H. Hennessy of the Durant Mfg. Co. and H. F. Zetterlund of the Zetterlund Engineering Works are leaders in the venture and plan to establish a central office where members can consult proposals and blue prints to determine on what they wish to bid.

460 Foundries Report on Scrap Steel Purchases

Cleveland

• • • With replies received on scrap rail purchases from around 460 foundries, W. W. Rose, executive vice-president of the Gray Iron Founders' Society, Inc., here, is now attempting to obtain information from the balance of 2673 foundries queried. Washington has asked for full data by Feb. 20, said Mr. Rose.

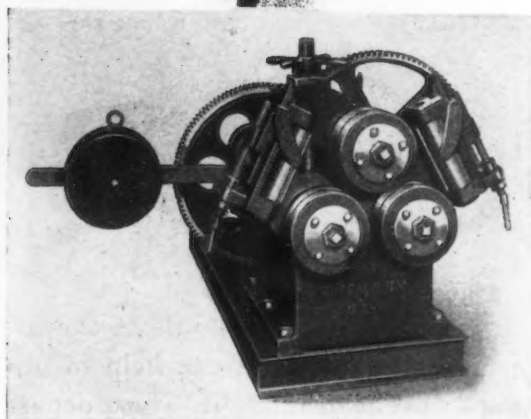
Around 200,000 gross tons were purchased in 1940 by the companies replying so far, according to Mr. Rose, who is seeking to assure an adequate supply of scrap rails for foundry operations, and who is "very much encouraged" by the attitude of cooperation at Washington. The Malleable Founders Society has sent inquiries out on the same subject and expects to chart its response, according to R. E. Belt, executive secretary.

Santa Fe Puts Diesel Locomotive in Freight Service

Chicago

• • • Transportation history was made early in February when the first diesel-electric locomotive was put into regular freight service by the Santa Fe railway. The 5400 hp. locomotive, capable of running at 75 mph. will carry freight from Chicago to California in four days, a sharp increase in delivery over former freight schedules.

What's to bend?



Arcs
Circles
Spirals
AND OTHER
Circular
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Don't let your "bending department" be a bottle-neck to slow down assembly demands! You can bend circular shapes with practically any type of stock on a Buffalo Bending Roll. Fast . . . easy to operate, even for unskilled labor. To save production dollars, write now for full details on Buffalo Bending Rolls. Ask for New Bulletin.

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Bending Rolls

80% of Canada's Steel Buying Under Priorities

Toronto

••• More than 80 per cent of fresh buying of iron and steel comes under the head of "priority business," for war purposes. Persistently heavy demand is reported for sheets and delivery dates on new orders are set for June and July. Plate orders have shown considerable increase recently, chiefly due to buying for ship construction and war tank building, but as in the past most of this business is going to producers outside Canada. Armor plate also has heavy call with Canadian output falling far short of meeting demands. Demand for merchant bars slowed down slightly during the week, but there is no scarcity of orders. Delivery dates range from May to June. Brisk demand is reported for spring steel, chiefly from the automotive industry, and one Ontario producer has placed a small mill in production exclusively on this account.

••• Clarence Wallace, president of Burrard Drydock Co., North Vancouver, B. C., announced that his company has just received orders for two more 9500 ton steel cargo ships, valued at \$3,600,000 for the British Government. These are in addition to the six previously contracted for at cost of \$12,000,000. The company has started construction work on a \$400,000 addition to its plant where the cargo vessels will be constructed.

For the two weeks ended Jan. 31 the Department of Munitions and Supply at Ottawa awarded 3177 contracts with total value of \$35,989,774 and included orders placed with United States companies amounting to \$8,807,217. Orders include:

Munitions—Dominion Arsenals, Ottawa, \$8,967,500; Renfrew Electric & Refrigerator Co., Ltd., Renfrew, \$193,320; T. W. Hand Fireworks Co., Ltd., Cooksville, \$96,680; Canadian Westinghouse Co., Ltd., Hamilton, \$66,484.

Ordnance—Small Arms, Ltd., Toronto, \$180,000; Research Enterprises, Ltd., Toronto, \$401,915.

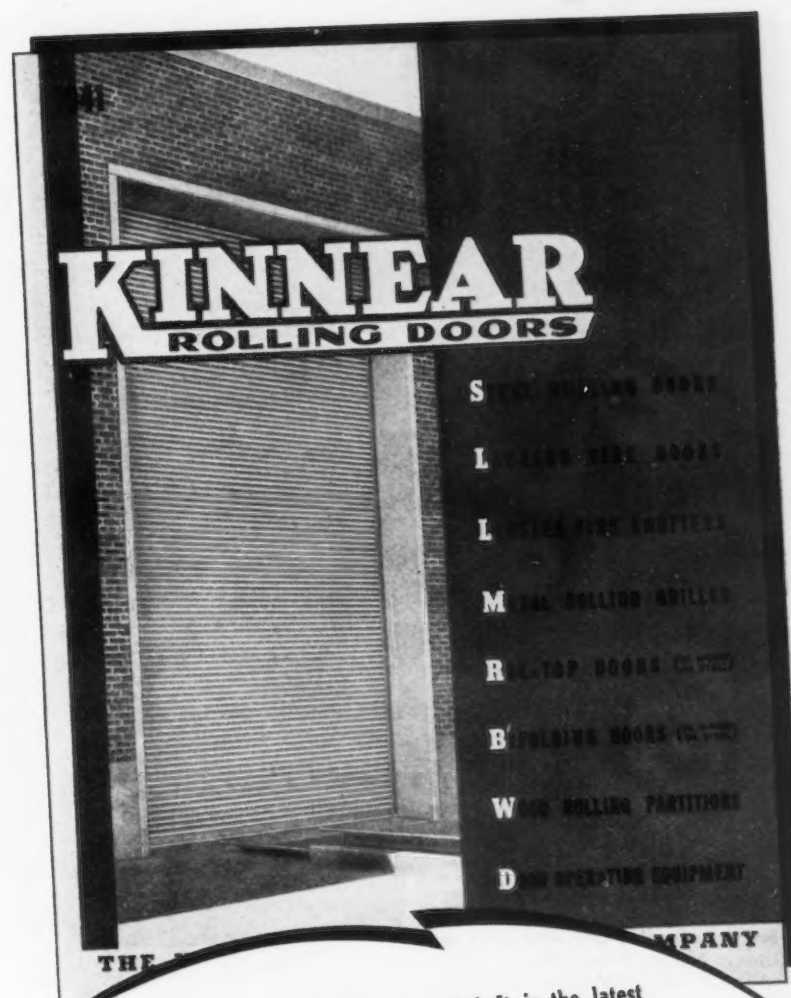
Aircraft—Fairchild Aircraft Ltd., Longueuil, \$72,600; Aviation Electric, Ltd., Montreal, \$29,993;

Canadian Vickers, Ltd., Montreal, \$38,476; Noorduyn Aviation, Ltd., Montreal, \$106,363; Steel Co. of Canada, Ltd., Hamilton, \$42,496; Link Mfg. Co., Ltd., Gananoque, \$662,643; Canadian Westinghouse Co., Ltd., Hamilton, \$113,539; Champion Spark Plug Co. of Canada, Ltd., Windsor, \$76,707; Leeders Limited, Winnipeg, \$29,400; Aircraft Repair, Ltd., Edmonton, Alta., \$24,888.

28,200 Employees Now On T.C.I.'s Payroll

Birmingham

••• Reflecting the high level of operations in its mills here, the number of employees on the payroll of the Tennessee Coal, Iron & Railroad Co. has reached approximately 28,200, an all-time record for the company.



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ROLLING DOORS

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How to Plate Brass and Bronze

(CONTINUED FROM PAGE 65)

amp. per sq. ft. provided Rochelle salts are added to the bath in quantities of 2 to 4 oz. per gal. The same authors also showed that with the Rochelle salt copper bath the cathode current density could be 30 to 40 amp. per sq. ft. or higher if need be. Therefore the new bath does not present any startling fea-

tures as far as anode and cathode current densities are concerned. The current efficiencies are in general higher than those obtained from the ordinary bath.

The new process has made use of addition agents and salts which make possible the deposition of thick bright or semi-bright smooth

plates at high current densities. It is felt that definite progress has been accomplished by placing such a process on the market.

Bronze Plating

In the true sense there is very little real bronze plating done to-day. It will be recalled that bronze is an alloy containing copper, tin, and sometimes zinc in different ratios. However, there is today tremendous amounts of so-called "bronze plate" produced in American industry, but this is really a misnomer, as the material contains only copper and zinc and no tin whatsoever. The plate as deposited has the appearance of bronze and is generally called by this name. It is used for decorative coatings on miscellaneous hardware and is substituted for brass whenever a darker colored coating is desired. The color of this alloy can vary from a rich gold to a dark brown.

There is very little difference in brass and bronze plating, as both are produced from the complex cyanide bath, the only difference in the two being the ratio of copper to zinc in the solution. In brass plating this is about four to one, while in bronze baths the ratio is about nine to one.

A typical formula is as follows:

	Oz. per Gal.
Copper cyanide	4
Zinc cyanide	0.4
Sodium cyanide	5
Free cyanide	0.5-1
Sodium carbonate	4

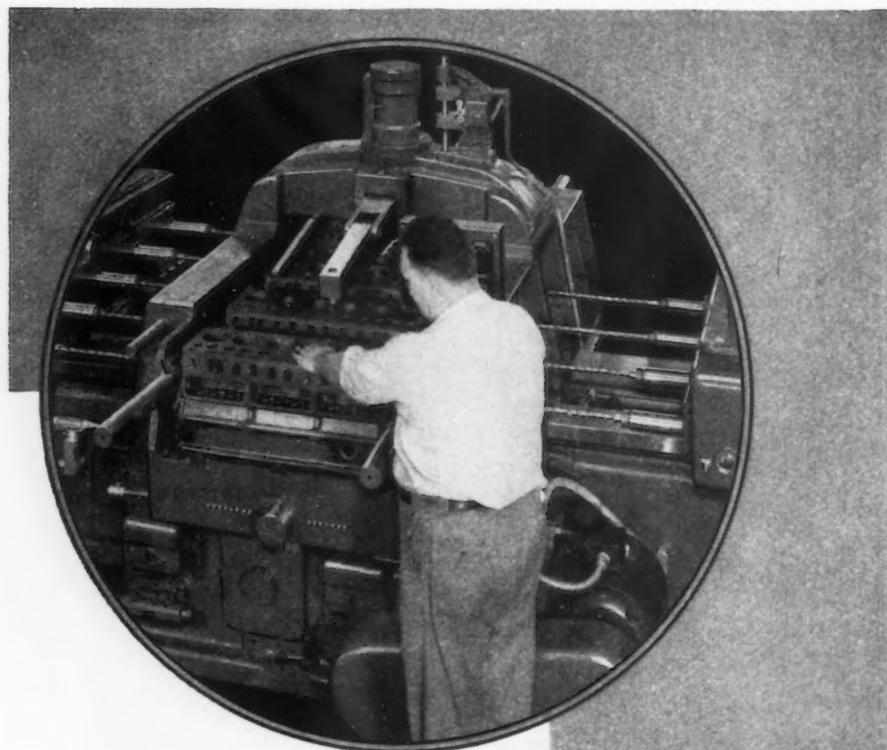
Ordinarily the above solution will produce a plate composed of 90 per cent copper and 10 per cent zinc, provided the following conditions are observed:

Current density	2-5 amp. per sq. ft.
Voltage	2-3 volts
Anodes	90 per cent copper, 10 per cent zinc
Temperature	75-90 deg. F.

As already pointed out, the solution may be operated at room temperature, but a slightly elevated one is better because the bath will plate faster and produce a more even colored coating. As the temperature is raised the copper content of the deposit is increased, which leads to a redder deposit being formed.

There is not very much data concerning the pH of bronze baths. However, this can be assumed to be about the same as that used in brass plating.

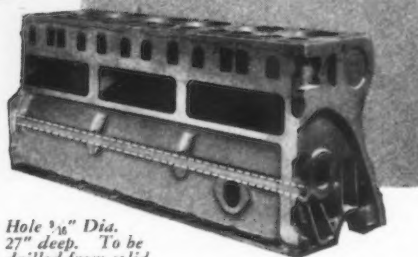
The free cyanide content is a very important item to control,



How to Drill a 5 Minute Hole in 36 Seconds

If you were called on to drill this hole in 100 cylinder blocks every hour, how would you do it? Drilling straight through with one drill and a standard machine would take five minutes—or longer. To get 100 blocks an hour you'd need about 9 machines and 9 operators.

Our analysis of the job resulted in this progress-through drilling machine. Dividing the drilling into five stations and adding an accurate horizontal index makes it possible for an *unskilled* operator to produce a completed block every 36 seconds. Salvaged drills can be used. In addition, the burden on



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27" deep. To be
drilled from solid.

individual drills is less, resulting in a minimum of tool maintenance costs.

When you're confronted with the need for increased production and considering the purchase of a battery of duplicate machines, you need this kind of machine design service.

Our booklet "Since 1872..." will show you how it has worked for others—send for your copy.



W. F. AND JOHN BARNES

ROCKFORD ILLINOIS

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TAPPING, MILLING, AND HONING MACHINES TO
SUIT YOUR PARTS—YOUR PRODUCTION.



especially if uniform colored coatings are desired. The range is from 0.5 to 1 oz. per gal., but the exact concentration should be determined and adhered to provided uniform work is to be continually produced. As the cyanide is decreased the color goes to the brown or red side. This is undoubtedly due to an increase of copper in the deposited alloy. The function of free cyanide in a bronze bath is similar to that of a brass bath, and it also restrains too much copper from depositing. However, there is not as much freedom here as in the former. If trouble is encountered in the anodes becoming passive due to the low free cyanide content, Rochelle salts can be added to improve anode corrosion. Here again the reduction is the same as in the brass bath. The concentration of Rochelle salts should be from 1-4 oz. per gal. with about 2 oz. per gal. being a good figure for general work.

The carbonate concentration is advantageous provided too much is not introduced. This material aids the conductivity of the bath thereby giving a faster plate. It must be kept in mind though, that an excess will cause the anodes to become passive and fail to go into solution. This, of course, will lead to complications such as changing the pH and metal content of the bath.

The exact status of ammonia in a bronze bath has not been defined. The general opinion is that a small amount of this material is beneficial but an excess is to be avoided as it produces plates having a non-uniform color. Ordinarily ammonia has a tendency to lighten the bronze deposit and produce light hues which are near the deep gold colors. These coatings are attractive as they imitate gold plates. If protected by lacquer the coatings can be used on cheap jewelry as a substitute for gold. It should be pointed out here, however, that ammonia in a bronze bath is extremely hard to control and a slight change in concentration produces a decided change in the shade of plate obtained. Therefore, as a general rule, this material is not used in bronze baths because of the sensitive effect upon the color of the resulting coating.

The temperature of a bronze solution is also very important. In fact the two variables which affect the deposit most are free cyanide and bath temperature. By slightly

changing either of these, entirely different shades can be obtained. It is obvious that such a change in shade can be disastrous when a particular finish is desired. In general the higher the temperature, the redder the deposit. This undoubtedly means that as the temperature is increased more copper is deposited. As a general rule a rise in temperature always aids the more noble metal in depositing and as copper is more noble than zinc, the former increases as the solu-

tion becomes warmer. Thus, it can be said that operating at a room temperature will produce a light colored plate while higher temperatures will produce darker or redder deposits.

Agitating a bronze solution will have a tendency to aid the deposition of the lighter shades. However, there seems to be some disagreement on this point as some operators claim that darker deposits are obtained when agitation is used. This disagreement can be

Reclaiming BABBITT

*from oily chips
after a rod*

Broaching Operation

This problem, in a large tractor plant, is only one of the many solved by Stearns Magnetic engineers to aid industry achieve more efficient and lower cost production.

You may have a similar problem in which the installation of magnetic separators can be definitely profitable. Get the facts from the pioneer house of Stearns Magnetic.



Reclaim your secondary metals with Stearns Magnetic separators. They will more than pay for themselves in the increased value of your scrap. Economical to operate and automatic.



Our new Bulletin 46, at left, will tell you all about it. Write for your copy today.

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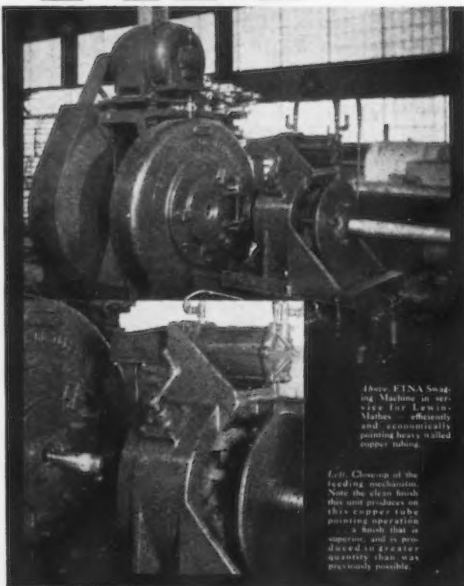
LEWIN-MATHES *Got the right answer at*

ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from 3/8" to 4" and the experience to help you get the most out of this type of machine.



These Etna Swaging Machines in service for Lewin-Mathes efficiently and economically pointing heavy-walled copper tubing.

Left: Closing of the tapering mechanism. Note the close finish this machine produces on this copper tube pointing operation. A finish that is superior, and is produced in greater quantity than was previously possible.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING...

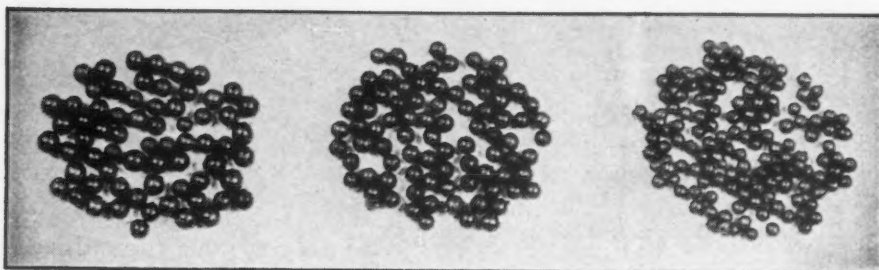
"Ask ETNA About Swaging"

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HEAT-TREATED STEEL SHOT

We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

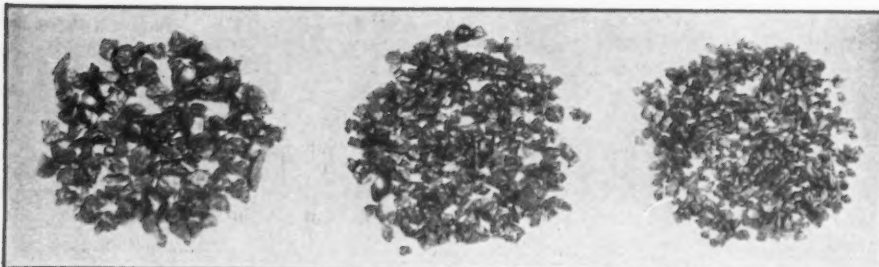
Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

HARRISON ABRASIVE CORPORATION

HEAT-TREATED STEEL GRIT

MANCHESTER, NEW HAMPSHIRE



explained by the fact that in the different cases the same cyanide concentrations, temperatures, etc., were not used.

It is a well known fact that there has not been nearly as much research in the deposition of bronze as of brass. This perhaps is due to the fact that there is more brass used than bronze. With the possibilities existing in this field, there should be more work undertaken. Let it be hoped that more investigators will turn to the field of bronze plating.

Before closing this discussion, it is felt that attention should be called to the fact that other white metals can be substituted for zinc in brass and bronze deposits. A good example of this is cadmium. This metal can be substituted with good results. It will be recalled cadmium is lower in the electromotive series than zinc and, therefore, is more corrosion resistant. This material when alloyed with copper has a tendency to deposit an alloy which is more tarnish resistant than the copper-zinc material. It should be pointed out though, that cadmium is much more expensive than zinc. Below is a formula which has been found to produce a uniform deposit, because of the fact that the bath is easier to control due to good anode corrosion and the comparative closeness of copper and cadmium in the electromotive series.

	Oz. per Gal.
Copper cyanide	3
Cadmium oxide	0.25
Sodium cyanide	4.5
Free cyanide	1.0
Sodium carbonate	3.0

The bath can be used at room or slightly elevated temperatures with two to three volts. This will produce a current density of 2-5 amp. per sq. ft. Copper cadmium anodes can be used. As this alloy is rather difficult to obtain, ordinary copper anodes are used and cadmium is added from time to time as the oxide. This is accomplished by making up a concentrated solution of cadmium oxide dissolved in sodium cyanide. The bath is easily controlled because the color of the deposit is an indication of the condition of the bath. Thus, a red deposit means that there is too much copper plating out, which is undoubtedly due to too low a concentration of cadmium. This can be corrected by adding solution containing the dissolved metal. If, on the other hand, a whitish deposit is obtained, there is too much cadmium present. This can be remedied by two methods: (1) Insert dummy cathodes and deposit out a

cadmium rich alloy. After running for a period the cadmium will be diminished and the desired alloy obtained. (2) An addition of cuprous cyanide is added directly to the bath in order to obtain the correct copper-cadmium ratio. This bath can be used for a great number of coatings.

References

¹Walter R. Meyer, Monthly Review, American Electroplaters Soc., March, 1938, p. 185.

²L. C. Pan, Ammonia in the Electrodeposition of Brass, Trans. Electrochem. Soc. LXXIV, 1938, pp. 425-446.

³R. Springer, Z. Elektrochem. 42, 732 (1932).

⁴"Rochelle Salt Cyanide Copper Baths," Proceedings American Electroplaters' Society, June, 1938, p. 147-161.

Rockford "Economy" Lathes To Be Made on West Coast

• • • Rights to build the line of Rockford "Economy" lathes heretofore manufactured by the Rockford Machine Tool Co., Rockford, Ill., have been sold to Frank Dalton, president of the D & M Machine Works, Torrance, Cal., according to an announcement by D. N. Macconel, president of Machinery Sales Co., of Los Angeles and San Francisco. The latter company has been selling these lathes in southern California for many years and arranged the deal. Last October, the Rockford firm gave up the production of lathes in order to concentrate on the manufacture of its hydraulic planers and shapers.

Arrangements have been made to move all lathe drawings, blueprints, patterns, jigs, fixtures and tooling to Torrance. Since 1925, the D & M Machine Works has been manufacturing replacement pistons for oil field work and other items involving a high degree of accuracy and mechanical skill. The company has its own power plant and foundry. Taking over of the Rockford lathe line will necessitate hiring at least 100 additional engineers and machinists.

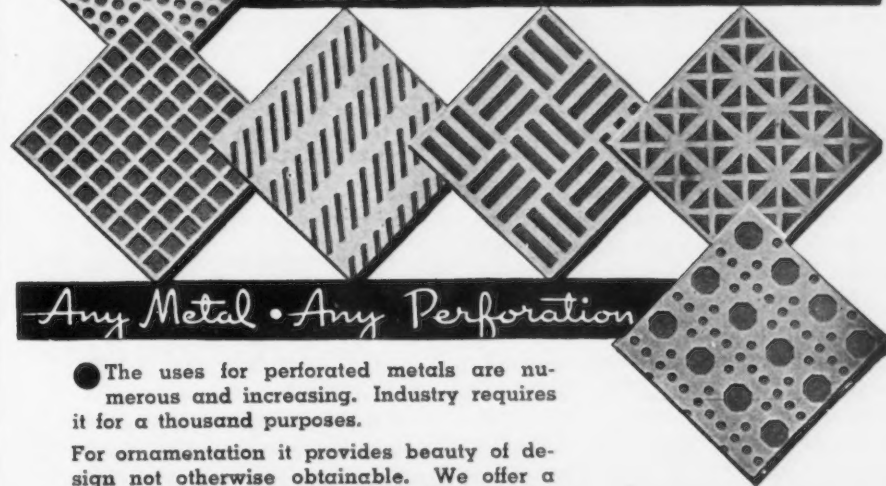
January Shipments at New High for U. S. Steel

• • • Shipments of finished steel products by U. S. Steel Corp. subsidiary companies reached 1,682,454 net tons in January, the highest for any January in the company's history.

The January shipments compare with 1,544,831 net tons in December, 1940, and with 1,145,592 net tons in January, 1940, an increase of 536,862 tons.

PERFORATED METAL

INDUSTRIAL and ORNAMENTAL



Any Metal • Any Perforation

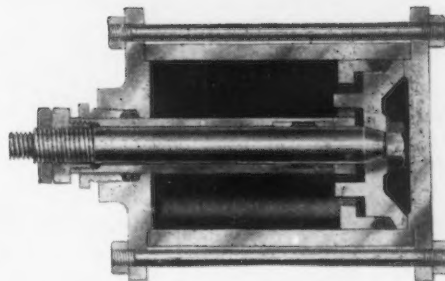
● The uses for perforated metals are numerous and increasing. Industry requires it for a thousand purposes.

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Write for Bulletin 34-A.

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Detroit Aircraft Goal May Be Doubled

Detroit

• • • A rapid multiplication of the tasks assigned to the automotive industry in the building of aircraft, engines and accessories in the national defense program has been forecast for Detroit. The program possibly will include a doubling of present projected schedules and the addition of several new ones.

Prospective increase of the schedule for production of bombing plane parts from the present figure, based on 15 planes a day, to a new one, based on 30 planes a day, has been predicted by C. C. Carlton, director of the Automotive Committee for Air Defense. The new schedule probably will be demanded by the time production is actually started, a few months hence.

The impending addition of three important projects heretofore not linked to the automotive program has also been made known. These will include manufacture of a pursuit plane and two high-output engines, according to John D. Biggers, assistant to William S. Knudsen, director general of the OPM. The plane, not designated yet, will be the one for which increased production is most drastically needed. The engines, it was indicated, will be the Allison liquid-cooled powerplant and the Pratt & Whitney 1830 series, 18-cylinder air-cooled motor developing 2000 hp. The latter now is scheduled for production by Ford at Detroit and by Buick.

The plane and the two engines are to be disassembled and displayed for study by the industry's engineers at the ACAD headquarters, 8505 W. Warren Ave. This was announced recently at a special meeting of the Automotive Parts & Equipment Manufacturers Association, of which Carlton is president.

At the same time, Dr. George J. Mead, of the defense commission, assured manufacturers that funds are available for procurement of tools and fixtures for sub-contract aircraft work. He said, however, that no more contracts for plant facilities would be let until a survey, now being made, is completed to determine what new capacity is available without further expansion.

Caterpillar Broadcasts Data on Annual Report

• • • Caterpillar Tractor Co. last week bought a half hour's time on radio station WMBD, Peoria, Ill., to interpret the company's annual pamphlet report to its 12,000 employees. The commentator was B. C. Heacock, Caterpillar president.

Strike Loss Small Hillman Reports

Washington

• • • Returning to his office after recuperating in a Baltimore hospital where he had been confined ever since being named associate director general of the Office of Production Management, Sidney Hillman, labor member on the National Defense Advisory Commission, last week sought to minimize the extent of strikes and industrial disputes under the defense program, emphasizing that of the total working time for the entire year 1940 less than two hours per worker were lost because of strikes. Mr. Hillman said this amounted to less than one-fourth of the loss due to industrial accidents.

Mr. Hillman quoted from a special study made at his request by the Bureau of Labor Statistics to back up his statement that "beyond question harmony prevails in employer-employee relations." The study showed that out of 300 threatened disputes arising since the advent of the defense program, "only a handful resulted in appreciable stoppages." Mr. Hillman said that all of these were of short duration.

Reviewing the period during which the extent of strikes and industrial disputes has prompted Congressional quarters to discuss the desirability of strike-curbing legislation, the study showed:

1. That work stoppages due to strike in American industry during the year of 1940 accounted for an average loss of less than a quarter of a day per year per worker.

2. That on-the-job accidents accounted for an average idleness of more than one day per worker, or

upwards of four times that due to strikes. The figure for accidents was said to omit "the tremendous loss resulting from more than 11,000 deaths."

3. That the number of man-days idle due to strikes was only half as great during the first six months of the defense program as in the corresponding period for 1939.

4. That the number of men involved in strikes was 47 per cent less during the first six months of the defense program than when the United States was actually at war 24 years ago. The report called these figures "all the more significant when it is realized that total non-agricultural employment is 22 per cent greater today than in 1917."

Credit for this record was given by Mr. Hillman to "the patriotism of organized labor," the "vast majority of responsible industrialists who have accepted the orderly processes of collective bargaining," the 16 members of Mr. Hillman's labor policy advisory committee made up of both AFL and CIO representatives, the Labor Department's conciliation service, and administrators of all federal labor legislation.

Pointing out that the rearmament program during the first World War was without benefit of collective agreements in basic mass production industries, the associate director general mentioned specifically existing agreements in steel, automobiles, shipbuilding and other industries, and added:

"That these pacts are working towards the permanent establishment of more amicable and constructive employer-employee relations has been demonstrated recently by the renewal of many agreements by such large manufacturers as Boeing, Briggs, Chrysler, Hudson, Fairchild, Brewster, several steel companies and various other concerns."

Birmingham Firm Plans \$1,000,000 Expansion

Birmingham

• • • Announcement of a \$1,000,000 construction and modernization program by Birmingham Electric Co. for 1941 was made here by Charles E. Oakes, president.

Columbia Steel to Expand on Coast

• • • Columbia Steel Co., subsidiary of United States Steel Corp., has announced the approval of a program for enlargement of its Pacific Coast facilities so as to embrace additional steel making and finishing mills. Work on this program, which involves an expected expenditure of upward of \$5,000,000, will commence in the near future.

The decision to build further facilities on the Pacific Coast is a recognition of the growing steel demands of that region coming from manufacturers engaged in supplying directly and indirectly the needs of the National Defense Program, as well as from other users of steel products.

The Columbia Steel Co., which was acquired by the United States Steel in 1930, is a fully integrated company owning and operating steel works at Pittsburgh and Torrance, Cal.; ore and coal mines and a blast furnace in Utah; open hearth furnaces, rolling, wire, nail, sheet and tin mills; foundries; and a wire rope and fence plant.

o o o

Washington

• • • The announcement of the Columbia Steel Co. program to enlarge its Pacific Coast steelmaking and finishing mill capacity excited interest in administration circles not only from the viewpoint of national defense but also because of an administration policy. On Oct. 31 of last year the White House issued a statement saying that encouraging construction of additional steel capacity on the Pacific Coast had long been a hobby with the President.

Capitalizing on this statement, Secretary of the Interior Ickes sought to convince the steel industry of the advantages of building up facilities on the Pacific Coast, one object in mind being to sell government electric power. In January of last year Mr. Ickes released a report from the Bonneville project, a Federal electric power development in the northwest, holding that a small iron and steel plant to produce iron and steel products for the western market was feasible "espe-

cially in view of the low cost power at such plants as Bonneville and Grand Coulee and ready availability of raw materials." Fitting into the plan then also was the administration contention of the necessity of decentralizing industry. The War and Navy Departments contributed to the plan by urging that wider distribution of plants now vulnerable to air attack would be in

500 Illinois Plants Lack Defense Orders

Chicago

• • • At least 500 Illinois plants have no defense work as yet and possess the facilities to handle this business, according to a recent plant facility survey. Metal working plants which indicated desire for preparedness work stated they had the ability to produce ordnance parts, ammunition, steel sheets, wire laboratory equipment and apparatus, metal stampings, forgings, castings, precision gages, machine tools, tools and dies, jigs, fixtures, foundry equipment, etc.

Firms listed available equipment including lathes, drills, rolls, planers, shears, grinders, welders, punch presses, milling machines, screw machines and flangers. One small manufacturer of fishing tackle said he could handle machine shop work, light forging, spot-welding, stamping and light wood-turning. It is reported that this manufacturer is handling defense sub-contracting work for five larger firms.

the best interest of national defense.

Pressing his plan, Mr. Ickes on Feb. 20, 1940, announced that the Sierra Iron Co. of Nevada had signed a 20-year contract with the Federal government for power from the Bonneville Dam providing for the construction of electric furnaces and a cast iron plant at Vancouver, Wash.

The contract was hailed as another step in the administration program to establish metal working industries in the Pacific Northwest by use of Bonneville electric power. This contract followed by a few weeks the execution of a contract with the Aluminum Co. of America for 32,000 kw. Bonneville power to serve a plant built near Vancouver.

Armco to Build Steel Plant at Houston

Washington

• • • The American Rolling Mill Co., Middletown, Ohio, has completed plans, in connection with national defense needs, for construction of a steel plant at Houston, Tex., to be located on the Houston Ship Channel, and to have an annual ingot capacity of 200,000 tons.

In announcing Armco's expansion program, William S. Knudsen, OPRM Director General, said that the plant will operate principally on scrap, manufacturing billets for shell forgings, structural steel, wire rods and wire products, light plates used in shipbuilding and various other similar products necessary to national defense.

It was stated that the plant is being financed by the RFC in cooperation with the steel company.

A great deal of scrap is accumulated at Houston, which because of high freight rates from the Southwest does not move to steel making centers such as Birmingham and St. Louis. Formerly much of this scrap went to Japan.

Allegheny Ludlum Adds 2 New Electric Furnaces

Pittsburgh

• • • Allegheny Ludlum Steel Corp., producer of alloy steels for machine tools, aircraft engine valves, and other equipment vital to defense needs, is increasing its capacity for melting special steels by approximately 4000 tons per month.

Announcement of the expansion was made by W. F. Detwiler, Allegheny Ludlum's board chairman. The increased capacity will be made possible by contracts just placed for the installation of two additional electric melting furnaces at the Brackenridge, Pa., plant.

Westinghouse to Build \$3 Million Lamp Plant

• • • Westinghouse Electric & Mfg. Co. will build a \$3,000,000 fluorescent lamp plant at Fairmont, W. Va., to supply lighting needs to any industrial plants working on national defense orders.

Economy Urged of Zinc Consumers

Washington

••• Because the shortage of zinc used in cartridge brass has become a major problem in the defense program in recent weeks, the non-ferrous metals and minerals priority committee early this week asked industrial users to economize in the production of items not vital to defense. Zinc producers at the same time were requested to cooperate in an effort to ease the flow of zinc into brass for cartridge manufacture.

Director of Priorities Edward R. Stettinius, Jr. was represented as believing that through these steps sufficient zinc may be freed for defense purposes and substantial economies effected by non-defense users so that the imposition now of formal priorities in zinc will not be necessary.

Auto Plants Move To Conserve Zinc for Defense

Detroit

••• Plans for definite moves on the part of the automobile industry to conserve essential materials for defense work, especially zinc, are being made, it was announced here last week by Paul G. Hoffman, vice president of the passenger car division, Automobile Manufacturers Association, and president of Studebaker Corp.

The industry was asked by the OPM to survey possibility of savings in strategic materials and to put these changes into effect as soon as model changes are made. It was found that studies of this nature, and investigations of alternate materials available, had already progressed so far at the time the request was received that "it is now possible to forecast release of very large quantities of special materials without delay, by voluntary action of the individual companies," Mr. Hoffman said.

(See discussion in today's "Assembly Line.")

Treasury Tungsten Stocks Available to Industry

••• An executive order authorizing the Treasury Department's Procurement Division to sell or otherwise dispose of its tungsten stocks "to such buyers or users and in such amounts as may be requested from time to time by the Office of Production Management" was signed by President Roosevelt on Feb. 4. Applications from industrial users for purchase of government stocks will be made to the Procurement Division and granted upon approval of the OPM. The sale price will be the cost of acquisition to the government.

It became known last week that the Navy Department had made its entire stock pile of tungsten available to industries working on defense orders.

England Took Bulk of Machine Tools in 1940

••• The accompanying table reveals that the United Kingdom took by far the largest share of metal working machinery exported from this country in 1940, exceeding the previous year's volume by four times. During World War I, the maximum amount of this class of machinery the British took out was \$20,438,000, in 1916. France received \$29,254,000 worth of American machine tools in 1917. Exports to France in 1940 were almost entirely in the first six months.

Although exports of machine tools to Japan and Russia have been subject to export licensing

Export Shipments of Metal Working Machinery (in Thousands)

	1938	1939	1940
Great Britain..	\$15,635	\$33,164	\$130,049
France	5,817	18,806	31,821
Russia	35,163	18,669	22,517
Japan	23,815	24,839	22,613
Canada	5,058	6,413	20,735
All countries..	101,656	112,572	246,516

Source: U. S. Bureau of Foreign and Domestic Commerce.

restrictions since July 5, 1940, the amounts shipped to both these countries in the last half of the year have been appreciable, amounting to \$6,863,606 for Japan and \$9,917,792 for Russia. Shipments to Canada steadily increased throughout the year.

20 Iron and Steel Producers Double Earnings in 1940

	Fourth Quarter 1940	Third Quarter 1940	Fourth Quarter 1939	Year 1940	Year 1939
United States Steel Corp.	\$32,763,251	\$33,103,067	\$28,729,178	\$102,181,321	\$41,119,934
Bethlehem Steel Corp.	14,516,779	12,462,288	13,028,928	48,677,524	24,638,384
Republic Steel Corp.	8,480,174	6,183,880	6,772,693	21,113,507	10,671,343
Jones & Laughlin Steel Corp.	4,044,126	2,956,647	2,907,755	10,277,029	3,188,944
National Steel Corp.	6,271,187	3,827,311	5,292,331	17,112,315	12,581,636
Youngstown Sheet & Tube Co.	5,549,976	2,842,280	3,693,225	10,815,468	5,004,484
Inland Steel Co.	4,561,901	4,918,818	4,574,441	14,450,385	10,931,016
Wheeling Steel Corp.	2,388,744	1,611,108	2,152,452	5,663,930	5,560,753
Continental Steel Corp.	286,631	139,312	477,754	778,738	1,208,199
Keystone Steel & Wire Co.	288,966	280,409	418,489	1,295,185	1,390,758
Rustless Iron & Steel Corp.	456,609	321,588	395,868	1,280,799	1,090,876
Copperweld Steel Co.	341,345	277,423	323,799	1,140,082	934,348
Acme Steel Co.	479,352	602,688	872,506	2,127,444	1,908,609
Carpenter Steel Co.	436,726	321,067	382,033	757,793†	577,624†
Pittsburgh Steel Co.	710,361	466,027	1,089,551	1,555,795	564,870
Wickwire-Spencer Steel Co.	250,651	125,851	127,156	64,659††	233,358††
Alan Wood Steel Co.	369,705	318,939	290,081	1,210,202	678,921
Allegheny Ludlum Steel Corp.	1,591,954	1,300,582	1,411,423	3,722,107	2,093,518
Interlake Iron Corp. ....	.....	.....	.....	829,450	553,978††
Otis Steel Co. ....	.....	464,665	.....	717,007	214,965
Total				\$245,641,422	\$123,571,846

†Six months ended Dec. 31. ††Loss.

Outlaw Strikes Staged At McDonald, Homestead

Pittsburgh

••• The epidemic of short lived "outlaw" strikes which have been condemned by management and CIO officers continue in the greater Pittsburgh district.

Carnegie-Illinois Steel Corp.'s McDonald mills at Youngstown, Ohio, where bar specifications consigned for national defense purposes were being turned out, was shut down 14 hr. last week by the action of several hundred warehouse employees. Approximately 3000 workmen were made idle. The strike was ended by union officials and the grievance sent on its way by regular procedure. The men precipitating the strike insisted on six days' work a week instead of five days, a condition which would have thrown out of work a "spell" crew utilized to observe the 40 hour a week union and governmental standard.

Carnegie-Illinois's 100 in. Homestead plant was shut down 48 hr. late last week by an outlaw strike brought on by approximately 200 shearmen and sympathizers who caused 1000 workers to become idle. Important national defense production was held up.

American Magnesium To Expand Production

••• As requested by the Office of Production Management of the national defense program, Aluminum Co. of America will start immediately the further expansion of operations of American Magnesium Corp. so that manufacture of magnesium products by the latter corporation will be greatly increased.

The Aluminum company has purchased the half interest in American Magnesium Corp. formerly owned by the General Aniline & Film Corp., and thus American Magnesium Corp. becomes a wholly owned subsidiary of Aluminum Company of America. This purchase, together with the establishment of new plant facilities at Buffalo, augmenting existing facilities at Cleveland, Los Angeles, and New Kensington, Pa., will require the expenditure by Aluminum company of several millions of dollars.

Plastics Seen Easing Defense Metal Shortage

••• The tremendous load now being placed on this country's capacity to produce non-ferrous materials can be alleviated to a considerable degree by the use of plastic materials, in the opinion of H. M. Richardson, chief engineer of the General Electric plastics department, Pittsfield, Mass.

"It is being demonstrated more emphatically every day that molded plastics can not only compete with die castings for thousands of different products, but can do a better job," Richardson says. "Although the cost of suitable plastics is generally higher than that of unfinished die castings, this is offset by the fact that no finishing operation is required for plastic parts."

Plastics have only half the density of aluminum. They are corrosion-resistant, and have comparable structural and impact strength. In addition, plastics provide excellent electrical insulation, Mr. Richardson points out.

Supreme Court Rules Against Ford Motor

Washington

••• The Supreme Court on Monday refused to review a labor board case involving the Ford Motor Co., thereby allowing to stand a Sixth Circuit Court of Appeals decision which had upheld the NLRB. The NLRB on Aug. 9, 1939, ordered the Ford company at its Dearborn and Highland Park plants in Michigan to cease and desist from discouraging membership in the CIO's United Automobile Workers Union, and to reinstate with back pay 23 employees.

Minnesota Defense, Inc. Organized at Minneapolis

Minneapolis

••• Minnesota Defense, Inc., has been formed by mayors and businessmen of the state to bring more defense business to Minnesota plants. Mayor George Leach, Minneapolis, is president of the organization; vice-presidents are Mayor C. R. Berghult, Duluth; J. B. Kollner, Fergus Falls; and treasurer, Harry Wrench, Minneapolis.

U. S. Contracts Awarded For 10 More Shipways

Washington

••• Contracts for construction of ten shipways and other shipbuilding facilities, involving an estimated government investment of \$6,462,500, were announced last week by the Maritime Commission. This action was taken under the emergency shipbuilding program, for which President Roosevelt last Thursday affixed his signature to a bill appropriating \$313,500,000 for the program.

Four ways costing an estimated \$1,322,500 will be constructed by the Alabama Drydock and Shipbuilding Co., in Mobile; and six ways will be built by the North Carolina Shipbuilding Co., in Wilmington, N. C., at an estimated cost of \$5,140,000.

Three other contracts providing for 22 ways to cost an estimated \$14,233,000 were made public on Jan. 13.

Construction work on shipbuilding facilities already is under way on yards at Portland, Ore.; Houston, Texas, and Wilmington, N. C. Designs for the ships are being perfected and contracts are expected to be signed shortly. Commission officials said that keels will be laid in all yards in April.

Folsom Resigns OPM Materials Group Post

••• Marion Folsom, treasurer of the Eastman Kodak Co., has resigned as head of the Mining and Mineral Products Section of the Material Branch, Division of Production, Office of Production Management, and has been succeeded by G. M. Moffett, former director of the Food Products Section.

Drydock Contract Is Awarded on West Coast

Washington

••• The Bureau of Yards and Docks, Navy Department, has awarded a contract to the Pacific Bridge Co., San Francisco, for construction of a drydock at the destroyer base, San Diego, Cal., on a cost plus fixed fee basis. The total estimated cost, including fee, of the contract is \$2,800,000.

Steel Output At New Peak; 6,943,084 Net Tons In January

Steel production during January established a new high record of 6,943,084 net tons of open hearth, bessemer and electric steel ingots and castings, according to the monthly report of the American Iron and Steel Institute.

The January report is the first monthly report of the institute to

include steel produced in electric furnaces as well as steel for castings produced by any process.

The reports issued monthly since January, 1927, covered only open hearth and bessemer steel ingot production, but previously issued monthly data have now been expanded to correspond

with reports now being released.

Steel production in January was 7 per cent greater than the comparable December output of 6,493,849 tons and was 20 per cent above output of 5,768,729 tons in January, 1940. In October of last year, the previous peak month, a total of 6,643,975 tons was produced.

During January the steel industry operated at an average of 97.1 per cent of capacity, as against 94.1 per cent in December and 83.4 per cent in January a year ago.

1940*

Based on reports by companies which in 1939 made 98.06% of the open hearth, 100% of the bessemer and 78.15% of the electric ingot and steel for castings production

Period	Estimated Production—All Companies								Calculated Weekly Production, All Companies	Number of Weeks
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net Tons	Percent of Capacity	Net Tons	Percent of Capacity	Net Tons	Percent of Capacity	Net Tons	Percent of Capacity		
January.....	5,371,390	86.0	285,714	56.1	111,625	70.0	5,768,729	83.4	1,302,196	4.43
February.....	4,219,991	72.3	205,527	43.2	101,623	68.2	4,527,141	70.0	1,093,512	4.14
March.....	4,090,224	65.5	191,559	37.6	108,307	67.9	4,390,090	63.5	990,991	4.43
1st Quarter.....	13,681,605	74.6	682,800	45.7	321,555	68.7	14,685,960	72.4	1,129,689	13.00
April.....	3,818,656	63.1	176,335	35.8	105,731	68.4	4,100,722	61.2	955,879	4.29
May.....	4,596,561	73.6	258,709	50.8	111,763	70.1	4,967,033	71.8	1,121,226	4.43
June.....	5,236,691	86.6	305,115	61.9	117,919	76.3	5,659,725	84.5	1,319,283	4.29
2nd Quarter.....	13,651,908	74.4	740,159	49.5	335,413	71.6	14,727,480	72.5	1,132,012	13.01
1st 6 months.....	27,333,513	74.5	1,422,959	47.6	656,968	70.1	29,413,440	72.4	1,130,851	26.01
July.....	5,284,406	84.8	322,567	63.5	120,512	75.7	5,727,485	83.0	1,295,811	4.42
August.....	5,686,755	91.0	369,770	72.6	130,761	82.0	6,187,286	89.5	1,396,679	4.43
September.....	5,550,642	92.0	365,289	74.2	141,010	91.5	6,056,941	90.7	1,415,173	4.28
3rd Quarter.....	16,521,803	89.2	1,057,626	70.1	392,283	83.0	17,971,712	87.7	1,368,752	13.18
9 months.....	43,855,316	79.5	2,480,585	55.1	1,049,251	74.4	47,385,152	77.6	1,210,658	39.14
October.....	6,076,701	97.3	408,317	80.2	158,957	99.6	6,643,975	96.1	1,499,769	4.43
November.....	5,888,547	97.3	420,448	85.3	161,248	104.4	6,470,243	96.6	1,508,215	4.29
December.....	5,924,325	95.1	399,434	78.6	170,090	106.9	6,493,849	94.1	1,469,197	4.42
4th Quarter.....	17,889,573	96.5	1,228,199	81.3	490,295	103.6	19,608,067	95.6	1,492,243	13.14
Total.....	61,744,889	83.8	3,708,784	61.7	1,539,546	81.8	66,993,219	82.1	1,281,431	52.28

Note—The percentages of capacity operated are calculated on weekly capacities of 1,410,130 net tons open hearth, 114,956 net tons bessemer and 36,011 net tons electric ingots and steel for castings, total 1,561,097 net tons; based on annual capacities as of December 31, 1939 as follows: Open hearth 73,721,592 net tons, bessemer 6,009,920 net tons, electric 1,882,630 net tons.

Revised figures.

1941

Based on reports by companies which in 1939 made 98.26% of the open hearth, 100% of the bessemer and 84.39% of the electric ingot and steel for castings production

Period	Estimated Production—All Companies								Calculated Weekly Production, All Companies	Number of Weeks
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net Tons	Percent of Capacity	Net Tons	Percent of Capacity	Net Tons	Percent of Capacity	Net Tons	Percent of Capacity		
January.....	6,282,713	99.2	451,637	76.0	208,734	95.0	6,943,084	97.1	1,567,288	4.43

Note—The percentages of capacity operated are calculated on weekly capacities of 1,430,102 net tons open hearth, 134,187 net tons bessemer and 49,603 net tons electric ingots and steel for castings, total 1,613,892 net tons; based on annual capacities as of December 31, 1940, as follows: Open hearth 74,565,510 net tons, bessemer 6,996,520 net tons, electric 2,586,320 net tons.

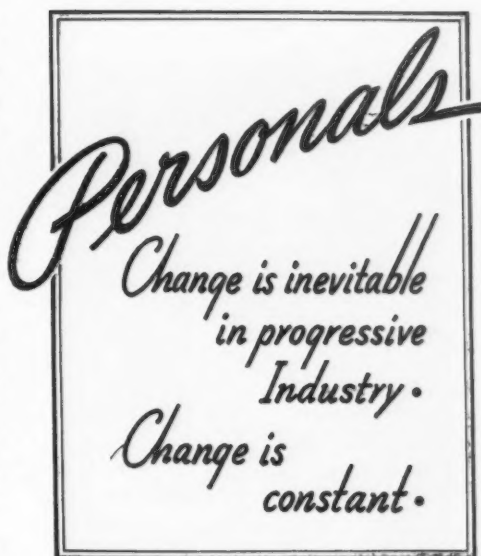
• **William L. Dolle**, heretofore vice-president of Lodge & Shipley Machine Tool Co., Cincinnati, has been elected president and general manager. **Fred Albrecht**, treasurer, has been made vice-president and treasurer, and **Louis L. Weber** remains as secretary. **Fred Schoeffler** has been made works manager.

• **H. T. Worthington** has been made New York district sales manager of the Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc., Muskegon. He will make his headquarters at the company's New York office in the Chrysler Building.

John P. Leland has been appointed agency supervisor in the Pittsburgh district for the Shaw-Box division, with headquarters in the Rockefeller Building, Cleveland.

• **L. D. Reed**, who has been associated for 26 years with the Whiting Corp., Harvey, Ill., both as an engineer and in a sales capacity, has been placed in charge of the company's newly-opened Philadelphia office in the Broad Street Station Building. Sales in this territory were formerly handled by **S. R. Vanderbeck** as a manufacturers' agent.

• **DeAlton J. Ridings** has been promoted to the post of general



manager, and **Harvey L. Ramsay** to general sales manager of the Porter-Cable Machine Co., Syracuse, N. Y.

• **E. J. Hunt**, operating manager of the Chrysler Tank Arsenal, Detroit, has the following on his staff: **N. J. Blake**, master mechanic; **E. G. Schubach**, assistant master mechanic; **H. E. Mills**, plant engineer; **W. A. Lavoie**, assistant plant engineer; **S. I. Carlson**, supervisor of planning; **D. A. Ringis**, chief tool engineer; **E. C. Lickteig**, chief tool designer; **A. C. Breitenbach**, chief inspector; **M. J. Leonard**, shop superintendent; **E. J. Reis**, shop superintendent, and **J. A. Murray**, shop supervisor.

• **James M. Mead**, formerly assistant manager of the Philadelphia plant of Joseph T. Ryerson & Son, Inc., Chicago, has been made manager of that plant, succeeding **Arthur C. Allshul**, who has retired.

Mr. Mead has served in many different departments during his 22 years of service with the company. He started with the Jersey City plant in 1919 and later traveled the northern New Jersey sales territory before his transfer from Newark to Philadelphia.

Mr. Allshul joined the Chicago plant of Ryerson in 1899, later becoming district sales manager at Milwaukee. In 1919, upon the acquisition of the Ferguson Steel & Iron Corp. by Ryerson, Mr. Allshul took charge as manager of that plant. He remained at Buffalo until 1929 when he was appointed manager of the Philadelphia plant.

• **R. H. Hathaway**, formerly sales engineer for Production Machin-

ery Co., Greenfield, Mass., has been appointed assistant to chief engineer **Henry J. Kingsbury**, Hammond Machinery Builders, Inc., Kalamazoo, Mich. Mr. Hathaway was educated at Technical High School, Fall River, Mass., and Tufts Engineering College, gaining his technical experience largely in the polishing and abrasive equipment field.

• **Harry A. Burdorf** and **Frank P. Rhame**, vice-presidents of the Lunkenheimer Co., Cincinnati, were elected to the board of directors at the annual stockholders meeting Jan. 27. Mr. Burdorf, who has been with the company since 1905, is vice-president in charge of sales, and Mr. Rhame, who has been with Lunkenheimer since 1919, is vice-president in charge of sales engineering.

• **Hubert Kaub** has been appointed representative in Colorado and Wyoming for the Universal Gear Corp., Indianapolis. He will make his headquarters at 740 Steele Street, Denver.

• **F. M. Gardner**, heretofore associated with the National Supply Co., has joined the diesel and gas engine sales department of the Cooper-Bessemer Corp., Mt. Vernon, Ohio. He will cover western Ohio, Indiana, Kentucky and Tennessee.



JAMES M. MEAD, new manager of Philadelphia plant of Joseph T. Ryerson & Son, Inc.



ARTHUR C. ALLSHUL, retired manager of Philadelphia Ryerson plant.

- **W. J. Long**, for the past 10 years manager of sales at the Worcester, Mass., plant of Universal-Cyclops Steel Corp., Bridgeville, Pa., has been transferred to the executive offices as assistant general sales manager. **W. P. Knecht** has taken Mr. Long's place as manager of the Worcester plant.

- **W. J. Huge**, who has been assistant to superintendent of blast furnaces at Gary works of Carnegie-Illinois Steel Corp., becomes assistant to division superintendent, coke plant and blast furnaces, quality control.

- **Ragnar Overberg**, former assistant to division superintendent of central mills, receives the post of assistant to division superintendent of steel production, quality control.

- **Ralph W. Dickson**, laboratory foreman since 1937, has been made assistant to division superintendent of the central mills, quality control.

- **D. L. Simpson**, a metallurgist since 1939, becomes chief observer, west mills, quality control.

- **Herbert M. Wilson** has been elected vice-president of the Shenango Furnace Co., Pittsburgh, having formerly been secretary of the company. Mr. Wilson, well



W. J. LONG, assistant general sales manager of Universal Cyclops Steel Corp.

known throughout pig iron circles, has spent the greater part of his career with the Shenango company, having been associated with them since the company was formed in 1906. He is also vice-president and director of the Shenango Penn Mold Co. and director of the Snyder Mining Co., an ore subsidiary in Minnesota.

- **William L. Dolle**, whose election as president-general manager of the Lodge & Shipley Machine Tool Co., was announced in these columns last week, succeeds as president, Mrs. Mary G. Lodge, who resigned after holding the executive office since the death of her husband, William Lodge, in 1917. Lodge and the late Murray Shipley founded the machine tool concern in 1892. Mr. Dolle also takes over the duties as general manager, which had been held by J. Wallace Carrel, prior to the latter's death last December. The new executive head started with the company as a machine hand in 1923 after having attended Georgetown University and after having been graduated from Xavier University. He became vice-president several years ago. The board also named **Fred Albrecht** as vice-president, in addition to his being re-elected treasurer. **Louis L. Weber** was re-elected secretary, and **Fred Schoeffier** was reappointed works manager.

- **C. M. Kaltwasser** has been named general manager of the Stinson Aircraft division of the Vultee Aircraft, Inc., at Wayne, Mich. Mr. Kaltwasser has been vice-president of the Timken-Detroit Axle Co., executive vice-president of the New York Shipbuilding Corp., president of the Marvel-Schebler Carburetor Co., Flint, Mich. He has been associated with the Nashville, Tenn., and Wayne plants for Vultee for a year. During his industrial career, Kaltwasser has directed the construction cruisers and destroyers for the Navy, production of automobile axles and carburetors and the manufacture of commercial and military aircraft. The Stinson plant currently is concentrating on production of three-place private planes and is developing a light training plane for military use.

- **Mason P. Rumney**, vice-president of the Detroit Steel Products Co., announced his candidacy for the spring convention of the Republican party for the post of regent of the University of Michigan.

- **Robert Murray**, formerly assistant superintendent, has been appointed superintendent of New Haven works of American Steel & Wire Co., U. S. Steel Corp. sub-



W. J. HUGE, assistant to division superintendent, coke plant and blast furnaces, Gary works of Carnegie-Illinois Steel Corp.



RAGNAR OVERBERG, assistant to division superintendent of steel production, quality control, Gary works of Carnegie-Illinois Steel Corp.

sidiary. He has been associated with the company in various positions since 1920.

- **Duane Stranahan**, vice-president of Champion Spark Plug Co., has been elected third vice-president of the Toledo Chamber of Commerce.

- **A. C. Streamer**, general manager of the East Pittsburgh division of Westinghouse Electric & Mfg. Co., has been elected vice-president of the company. **Bonnell W. Clark**, president of the Westinghouse Electric Supply Co., New York; **R. A. McCarty**, manager of the steam division, Philadelphia, and **Frank D. Newbury**, manager of the emergency products division, Pittsburgh, have been elected vice-presidents.

- **William S. Roberts** has been appointed vice-president and general manager of General Motors of Canada, Ltd. He succeeds **Harry J. Carmichael**, who has resigned to accept a key position at Ottawa in Canada's war production program.

- **F. F. Schwilk** and **Earl Ginn** have been elected vice-presidents of Continental Motors Corp., Detroit and Muskegon, Mich. Mr. Schwilk was formerly sales manager and Mr. Ginn was assistant chief engineer in charge of the automobile engine division. All directors were reelected at the annual stockholders meeting and **James H. Ferry, Jr.**, was elected to take the position on the board made vacant last year by the death of his father.

- **Thomas Rutherford** has been appointed district manager of sales at Philadelphia for the Midvale Co., Philadelphia.

- **T. J. Naughton**, formerly of the Chicago office of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., has been transferred to Minneapolis to cover Minnesota and North Dakota, and portions of South Dakota, Iowa and Wisconsin. **E. C. Robinet**, heretofore of the Los Angeles office, has been sent to cover the Pacific Northwest, with headquarters at Seattle. **J. E. Day**, formerly a representative of the Kester Machinery Co., has joined Manning, Maxwell as representative in the Charlotte, N. C., district, and **W. F. Williams** has joined the organization to cover the oil industry. He will make his headquarters in Chicago.

Obituary

- **Karl S. Breckenridge**, formerly vice-president and director of American Can Co., New York, died at St. Elizabeth's Hospital in Chicago on Jan. 28. He joined the company as factory manager and sales agent at Toledo in 1901. He held a number of executive positions, including assistant general manager at Boston, San Francisco, Chicago, and later division superintendent at Toledo and Chicago and as general manager of manufacture at New York. He was elected in 1923 to vice-president in charge of operations in the Central district with headquarters in Chicago. He had retired recently.

- **George N. DeGuire**, director and assistant to the president of the Locomotive Firebox Co. and member of the executive staff of the Oxweld Railroad Service Co., a unit of Union Carbide & Carbon Corp., died suddenly at his home in New Rochelle, N. Y., on Jan. 26, aged 56 years.

- **Warren L. Neu**, formerly vice-president of Hanson-Van Winkle-Munning Co., Matawan, N. J., died at his home on Jan. 10 after a long illness. He joined the sales staff of A. P. Munning Co. in 1919, later becoming assistant sales manager. After the merger with the Hanson & Van Winkle Co., he was engaged in special sales work, becoming assistant sales manager in 1930. He was made a director and in 1934 was elected a vice-president, continuing in that capacity until 1939, when he retired because of ill health.

- **Harry P. Martin**, president of Elwood Machine & Tool Co., Detroit, was fatally injured Jan. 24 when he was struck by lightning while fishing from a cruiser off West Palm Beach, Fla. Mr. Martin, 45 years old, was born in Palestine, Ill., and went to Detroit in 1915 as a toolmaker for Hudson Motor Car Co. He had been connected with the Elwood company for 12 years.

- **John Clarkson Jay**, 61 years old, who was chairman of the board of the old Maxwell Motor Co.,

from 1914 to 1916 and later was chairman of the Republic Truck Co., Alma, N. Y., died Jan. 23 in New York. He served an apprenticeship in the old Pennsylvania Steel Co. In the interval between the Maxwell and Republic connections, he was president of Pierce-Arrow Motor Car Co., Buffalo, for two years.

- **Edward T. Oliver**, widely known at Cleveland as a sales representative of several machine tool manufacturers, died Jan. 24 at his home at the age of 50.

- **John A. Halk**, retired partner of the Kling Mfg. Co., Milwaukee, died suddenly in Los Angeles Jan. 25, aged 73 years.

- **Charles Raymond Messinger**, aged 57, president of the Chain Belt Co., and chairman of the board of Oliver Farm Equipment Co., died Feb. 4 at his home in Milwaukee from a heart attack. His death followed by less than five weeks the demise of his wife, also as the result of a heart ailment.

Graduate of Sheffield Scientific School of Yale University in 1906, he began his business career as a salesman for Harbison Walker Refractory Co. Mr. Messinger went to Milwaukee in 1909 to accept an executive position with the Sivyer Steel Casting Co. and in 1929 was elected chairman of the board. He was a director of the Interstate Drop Forge Co., Milwaukee Gas Light Co., Federal Malleable Co. and of several financial concerns. He served as vice-president and general manager of Chain Belt from 1917 to 1923, as president to 1931, as chairman of the board to 1934, and again as president in 1934 due to the death of his brother, Clifford F. Messinger.

- **William T. Morgan**, since 1929 chief metallurgist of Taylor Instrument Companies, Rochester, N. Y., died of heart disease at the General Hospital in that city, on Feb. 1, aged 46 years. He was a native of Wales and received his technical education at Sheffield University. After the war he was associated with R. D. Thomas & Co. and after coming to this country joined Babcock & Wilcox Co. He became identified with the Taylor Instrument Companies in 1929.

48,584,860 TONS OF SEMI-FINISHED AND FINISHED PRODUCED IN DECEMBER

The American Iron and Steel Institute's monthly report of semi-finished and finished steel produced for sale shows a 1940 total of 48,584,860 net tons, of which December output was 4,909,448 tons, including 290,244 tons sold to mem-

bers of the industry for further conversion. Products produced for export sale during the year totaled 7,693,858 tons.

On the basis of percentage of rolling mill capacity utilized during February, sheets took first rank,

with a rate of 95.1 per cent. Other high rates were 86.8 per cent for plates, 79.1 per cent for bars, 89.4 per cent for butt-weld pipe, 86.2 per cent for mechanical tubing, 87 per cent for drawn wire, 75 per cent for cold reduced tin plate.

AMERICAN IRON AND STEEL INSTITUTE											
Capacity and Production for Sale of Iron and Steel Products											
December - 1940											
	Number of companies	Items	Annual Capacity Net tons	PRODUCTION FOR SALE—NET TONS							
				Current Month				To Date (12 Months - 1940)			
				Total	Per cent of capacity	Shipments		Total	Per Cent of capacity	Shipments	
						Export	To members of the industry for conversion into further finished products			Export	To members of the industry for conversion into further finished products
Ingot, blooms, billets, slabs, sheet bars, etc.	34	1	xxxxxxx	665,829	xxx	305,149	121,095	5,725,868	xxx	2,677,936	1,193,123
Heavy structural shapes	8	2	5,205,300	331,299	73.5	35,373	xxxxxxx	3,149,036	60.5	409,443	xxxxxxx
Steel piling	4	3	328,000	20,296	73.2	427	xxxxxxx	215,234	65.6	19,950	xxxxxxx
Plates—Sheared and Universal	20	4	6,095,450	447,408	86.8	65,451	4,451	4,194,932	68.8	637,637	23,774
Skelp	8	5	xxxxxxx	80,653	xxx	10,351	37,640	845,313	xxx	174,065	317,739
Rails—Standard (over 60 lbs.)	4	6	3,647,600	110,255	35.8	26,280	xxxxxxx	1,487,113	40.8	224,996	xxxxxxx
Light (60 lbs. and under)	6	7	306,800	17,722	68.3	6,625	xxxxxxx	134,729	43.9	51,574	xxxxxxx
All other (Incl. girder, guard, etc.)	2	8	118,000	2,640	26.5	918	xxxxxxx	27,893	23.6	5,539	xxxxxxx
Splice bar and tie plates	15	9	1,300,200	26,249	23.9	1,610	xxxxxxx	481,271	37.0	11,981	xxxxxxx
Bars—Merchant	35	10	xxxxxxx	492,437	xxx	57,036	55,490	4,760,914	xxx	721,178	395,465
Concrete reinforcing—New billet	16	11	xxxxxxx	106,244	xxx	20,262	xxxxxxx	1,299,455	xxx	269,065	xxxxxxx
Rolled	18	12	xxxxxxx	9,480	xxx	1,528	xxxxxxx	142,480	xxx	10,388	xxxxxxx
Cold finished—Carbon	18	13	xxxxxxx	86,668	xxx	3,299	xxxxxxx	724,504	xxx	24,075	xxxxxxx
Alloy—Hot rolled	16	14	xxxxxxx	115,795	xxx	12,550	11,532	1,044,715	xxx	94,646	82,265
Cold finished	15	15	xxxxxxx	11,131	xxx	1,046	xxxxxxx	99,589	xxx	5,624	xxxxxxx
Hoops and baling bands	5	16	xxxxxxx	7,012	xxx	152	xxxxxxx	100,100	xxx	8,636	xxxxxxx
TOTAL BARS	54	17	12,399,265	828,767	79.1	95,873	67,022	8,171,757	66.0	1,133,612	477,730
Tool steel bars (rolled and forged)	15	18	110,220	8,512	91.3	807	xxxxxxx	74,176	67.3	6,720	xxxxxxx
Pipe and tube—B. W.	13	19	1,851,860	140,043	89.4	9,737	xxxxxxx	1,157,144	62.5	81,573	xxxxxxx
L. W.	10	20	1,246,340	34,366	32.6	3,596	xxxxxxx	360,188	28.9	34,141	xxxxxxx
Electric weld	5	21	735,520	31,403	50.5	1,624	xxxxxxx	288,424	39.2	29,456	xxxxxxx
Seamless	15	22	3,159,840	127,859	47.9	18,247	xxxxxxx	1,759,567	55.7	209,821	xxxxxxx
Conduit	6	23	151,145	9,775	76.5	123	xxxxxxx	82,042	54.3	1,773	xxxxxxx
Mechanical Tubing	13	24	554,825	40,431	86.2	4,966	xxxxxxx	313,877	56.6	27,573	xxxxxxx
Wire rods	18	25	xxxxxxx	118,319	xxx	14,092	21,848	1,238,344	xxx	334,794	196,787
Wire—Drawn	37	26	2,255,210	165,791	87.0	14,051	1,533	1,552,912	68.9	169,631	12,555
Nails and staples	19	27	1,091,690	64,400	69.8	4,676	xxxxxxx	641,453	58.8	59,623	xxxxxxx
Barbed and twisted	16	28	438,270	21,564	58.2	5,643	xxxxxxx	213,825	48.8	53,514	xxxxxxx
Woven wire fence	15	29	772,790	22,694	34.7	136	xxxxxxx	230,278	29.8	2,079	xxxxxxx
Bale ties	11	30	119,050	4,064	40.4	47	xxxxxxx	67,610	56.8	341	xxxxxxx
All other wire products	5	31	27,030	435	19.0	-	xxxxxxx	5,302	19.6	-	xxxxxxx
Fence posts	13	32	147,485	4,469	35.8	182	xxxxxxx	54,434	36.9	1,044	xxxxxxx
Black plate	12	33	653,295	22,024	39.9	2,040	20	338,655	51.8	45,134	56,104
Tin plate—Hot rolled	9	34	1,201,960	17,514	17.2	487	xxxxxxx	422,028	35.1	75,619	xxxxxxx
Cold reduced	10	35	2,930,860	185,907	75.0	16,259	xxxxxxx	2,267,828	77.4	325,010	xxxxxxx
Sheets—Hot rolled	26	36	xxxxxxx	593,321	xxx	41,512	15,770	5,756,385	xxx	518,245	160,388
Galvanized	16	37	xxxxxxx	155,823	xxx	11,716	xxxxxxx	1,551,374	xxx	156,854	xxxxxxx
Cold rolled	18	38	xxxxxxx	254,681	xxx	4,871	xxxxxxx	2,436,539	xxx	74,560	xxxxxxx
All other	15	39	xxxxxxx	62,079	xxx	1,428	xxxxxxx	601,813	xxx	23,152	xxxxxxx
TOTAL SHEETS	27	40	13,255,610	1,065,904	95.1	59,527	15,770	10,346,111	78.1	772,811	160,388
Strip—Hot rolled	24	41	5,525,110	159,701	53.6	7,816	20,865	1,529,877	43.4	89,760	180,689
Cold rolled	35	42	1,313,360	88,702	79.9	1,105	xxxxxxx	790,346	60.2	16,929	xxxxxxx
Wheels (car, rolled steel)	5	43	424,385	20,093	56.0	109	xxxxxxx	191,870	45.2	2,638	xxxxxxx
Axles	5	44	472,280	13,877	34.8	119	xxxxxxx	108,088	22.9	2,438	xxxxxxx
Track spikes	11	45	327,275	9,374	33.9	317	xxxxxxx	107,197	32.8	4,622	xxxxxxx
All other	3	46	9,100	1,109	144.2	39	xxxxxxx	10,138	111.4	81	xxxxxxx
TOTAL STEEL PRODUCTS	134	47	xxxxxxx	4,909,448	xxx	713,802	290,244	48,584,860	xxx	7,693,858	2,618,889
Estimated total steel finishing capacity based on a yield from ingots of 68.9 %											
	-	48	53,946,300	xxxxxxx	101.3	xxxxx	xxxxxxx	xxxxxxx	85.2	xxxxxxx	xxxxxxx
Pig iron, ferro manganese and spiegel	26	49	xxxxxxx	699,025	xxx	66,468	247,868	6,097,353	xxx	557,529	1,755,865
Ingot moulds	4	50	xxxxxxx	59,916	xxx	452	xxxxxxx	509,868	xxx	4,903	xxxxxxx
Bars	10	51	160,600	3,617	26.6	2	102	33,147	20.6	366	1,874
Pipe and tubes	3	52	109,377	4,391	47.5	219	xxxxxxx	43,926	40.2	1,227	xxxxxxx
All other	3	53	71,180	1,028	17.1	351	-	12,635	17.8	2,874	2,326
TOTAL IRON PRODUCTS (ITEMS 51 to 53)	12	54	276,247	9,036	38.7	572	102	89,708	32.5	4,467	4,201

U. S. Steel Exports for December 805,158 Tons

• • • Iron and steel exports, totaling 7,785,540 gross tons and valued at \$476,351,104, were larger in 1940 by nearly 25 per cent than in any previous year, preliminary figures released by the Metals and Minerals Division of the Bureau of Foreign and Domestic Commerce reveal. In 1939 this trade had amounted to 2,499,002 tons valued at \$180,995,835, while the tonnages exported in the record World War years of 1916, 1917, and 1918 had been 5,885,946, 6,268,546, and 5,370,265 tons, respectively.

December exports—735,178 tons valued at \$44,259,176—by increasing slightly over November—713,827 tons valued at \$42,863,811—put an end to the three months' long decline which had followed the peak August trade and compare with the 394,035-ton, \$30,099,593 trade of December, 1939.

The United Kingdom, with purchases totaling 362,366 tons (compared with 400,953 tons in November), took 49 per cent of the December shipments. Japan, whose purchases rose sharply from 9401 tons in November to 85,752 tons in December, ranked second with Canada—70,774 tons against 83,946 tons in the month preceding—third. Other leading buyers were the Union of South Africa, 23,097 tons, and Brazil, 22,260 tons.

In point of tonnage, non-alloy ingots—240,095 tons—was the leading commodity exported in December, this total including the 177,001 tons taken by the United Kingdom and the 48,669 tons which moved to Japan. Purchases made by these two countries also featured the 70,856-ton trade in pig iron with the United Kingdom receiving 57,917 tons and Japan 4764 tons.

U. S. IMPORTS—DECEMBER, 1940 (In Gross Tons)

Pig Iron	
none	
Iron Ore	
Canada	2,780
Mexico	438
Newfoundland and Labrador	3,750
Cuba	17,100
Brazil	7,040
Chile	142,600
	173,708
Manganese Ore (35 per cent and over) Battery Grade	
India	1,433
Union of South Africa	453
Gold Coast	1,567
	3,453
Other	
Russia	3,726
Cuba	5,546
Brazil	5,471
India	22,785
Netherland Indies	531
Philippine Islands	3,598
Union of South Africa	3,607
Gold Coast	10,157
	55,421

IMPORTS

December		Twelve Months Ended December	
1940	1939	1940	1939
3,694	1,318	10,242	38,592
64	7,052	24,219	71,977
...	108	1,256	1,731
...	77	223	358
...	176	610	1,879
48	1,267	2,026	29,492
3,806	9,998	38,576	144,029
...	143	440	743
...
...	1,058	3,986	10,692
...	1,201	4,426	11,455
2	2	122	1,406
...
...
2	1	15	28
...
1	504	1,861	19,426
...	180	198	932
...
...	100	871	1,356
5	265	629	23,671
...
...
...	667	716	39,065
26	...	52	5
22	19	137	99
...
...	...	113	4,484
107	363	2,964	26,104
...
...	270	889	2,518
6	106	525	1,664
...	325	86	15,249
55	343	2,216	4,634
3	171	112	7,288
1	13	131	118
5	16	1,589	7,785
...	1	12	89
...	...	3	324
235	3,346	13,241	156,707
...	115	419	1,697
...	...	29	144
23	49	612	1,149
...
...
23	164	1,060	2,990
4,064	14,709	57,303	315,161

EXPORTS

December		Twelve Months Ended December	
1940	1939	1940	1939
70,856	18,912	555,471	177,024
203	1,066	13,036	2,923
...
2,646	848	24,490	4,042
...
69,980	206,402	2,823,088	3,577,427
143,685	227,228	3,416,085	3,761,416
240,095	47,995	2,265,064	167,171
17,979	12,004	254,961	48,579
11,134	11,817	149,383	81,693
15,786	6,820	286,590	31,450
284,994	78,636	2,955,998	328,898
39,227	28,793	491,556	274,568
13,403	12,671	164,616	110,968
736	487	9,796	3,811
167	124	1,776	1,094
70,777	30,043	596,274	258,375
196	71	5,422	2,114
144	32	596	154
59,172	38,501	673,201	192,977
1,500	119	14,455	865
5,107	2,819	42,417	14,619
345	50	1,663	296
15,934	12,665	196,951	87,360
87	163	1,614	621
29	44	866	975
218	607	12,059	7,692
40,423	12,338	407,156	115,465
6,335	8,230	74,308	38,339
15,811	58,122	383,330	311,017
9,273	4,997	38,134	28,734
10,847	10,902	115,888	57,358
14,337	17,920	210,893	98,124
2,600	4,271	26,890	15,167
7,125	4,914	87,600	32,235
1,213	1,056	13,360	6,059
6,042	7,581	52,288	58,632
10,101	11,196	131,401	64,288
908	743	7,823	6,461
2,901	1,129	33,381	8,858
27,523	7,823	269,666	75,382
...
3,764	2,581	23,490	10,898
366,245	280,992	4,098,870	1,883,506
2,693	7,589	69,969	46,148
388	633	5,007	4,608
3,726	2,830	38,150	20,579
741	342	5,368	3,398
2,676	2,187	19,181	27,881
10,234	13,581	137,675	102,614
805,158	600,437	10,608,628	6,076,429

¹ In imports the tonnage shown is the alloy content—the manganese, chromium, and silicon content, as the case may be. ² Imports include skelp and saw plate. ³ Import figures include iron slabs. ⁴ Imports include sashes and frames only.

* No separate figures.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	Feb. 11 1941	Feb. 4 1941	Jan. 14 1941	Feb. 13 1940		Feb. 11 1941	Feb. 4 1941	Jan. 14 1941	Feb. 13 1940
Flat Rolled Steel: (Cents Per Lb.)					Pig Iron: (Per Gross Ton)				
Hot rolled sheets.....	2.10	2.10	2.10	2.10	No. 2 fdy., Philadelphia..	\$25.84	\$25.84	\$25.84	\$24.84
Cold rolled sheets.....	3.05	3.05	3.05	3.05	No. 2, Valley furnace....	24.00	24.00	24.00	23.00
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50	No. 2, Southern Cin'ti....	24.06	24.06	23.06	23.06
Hot rolled strip.....	2.10	2.10	2.10	2.10	No. 2, Birmingham.....	19.38	19.38	19.38	19.38
Cold rolled strip.....	2.80	2.80	2.80	2.80	No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Plates.....	2.10	2.10	2.10	2.10	Basic, del'd eastern Pa...	25.34	25.34	25.34	24.34
Tin and Terne Plate: (Dollars Per Base Box)					Basic, Valley furnace...	23.50	23.50	23.50	22.50
Tin plate.....	\$5.00	\$5.00	\$5.00	\$5.00	Malleable, Chicago†.....	24.00	24.00	24.00	23.00
Manufacturing ternes...	4.30	4.30	4.30	4.30	Malleable, Valley.....	24.00	24.00	24.00	23.00
Bars and Shapes: (Cents Per Lb.)					L. S. charcoal, Chicago..	30.34	30.34	30.34	30.34
Merchant bars.....	2.15	2.15	2.15	2.15	Ferromanganese‡.....	120.00	120.00	120.00	100.00
Cold finished bars.....	2.65	2.65	2.65	2.65	†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.				
Alloy bars.....	2.70	2.70	2.70	2.70	Scrap: (Per Gross Ton)				
Structural shapes.....	2.10	2.10	2.10	2.10	Heavy melt'g steel, P'gh.	\$20.75	\$21.25	\$21.75	\$17.75
Wire and Wire Products: (Cents Per Lb.)					Heavy melt'g steel, Phila.	20.00	20.00	20.50	17.50
Plain wire.....	2.60	2.60	2.60	2.60	Heavy melt'g steel, Ch'go	19.25	19.25	19.75	15.75
Wire nails.....	2.55	2.55	2.55	2.55	Carwheels, Chicago.....	20.25	20.75	20.75	17.25
Rails: (Dollars Per Gross Ton)					Carwheels, Philadelphia..	23.00	23.00	23.00	20.25
Heavy rails.....	\$40.00	\$40.00	\$40.00	\$40.00	No. 1 cast, Pittsburgh...	22.25	22.25	21.75	18.25
Light rails.....	40.00	40.00	40.00	40.00	No. 1 cast, Philadelphia..	23.75	23.75	23.50	20.25
Semi-Finished Steel: (Dollars Per Gross Ton)					No. 1 cast, Ch'go (net ton)	19.25	18.75	18.75	14.00
Rerolling billets.....	\$34.00	\$34.00	\$34.00	\$34.00	Coke, Connellsville: (Per Net Ton at Oven)				
Sheet bars.....	34.00	34.00	34.00	34.00	Furnace coke, prompt...	\$5.50	\$5.50	\$5.50	\$4.00
Slabs.....	34.00	34.00	34.00	34.00	Foundry coke, prompt...	5.75	5.75	5.75	5.25
Forging billets.....	40.00	40.00	40.00	40.00	Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Wire Rods and Skelp: (Cents Per Lb.)					Copper, electro., Conn.*..	12.00	12.00	12.00	11.25
Wire rods.....	2.00	2.00	2.00	2.00	Copper, Lake, New York.	12.00	12.00	12.00	11.25
Skelp (grvd).....	1.90	1.90	1.90	1.90	Tin (Straits), New York.	50.25	50.375	50.10	46.00
					Zinc, East St. Louis.....	7.25	7.25	7.25	5.50
					Lead, St. Louis.....	5.50	5.35	5.35	4.85
					Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 131-140 herein. On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

FINISHED STEEL				PIG IRON				SCRAP STEEL			
Feb. 11, 1941	2.261c. a Lb.			\$23.44	a Gross Ton			\$20.00	a Gross Ton		
One week ago	2.261c. a Lb.			\$23.44	a Gross Ton			\$20.17	a Gross Ton		
One month ago	2.261c. a Lb.			\$23.44	a Gross Ton			\$20.66	a Gross Ton		
One year ago	2.261c. a Lb.			\$22.61	a Gross Ton			\$17.00	a Gross Ton		
High				High				High			
Low				Low				Low			
1941.....	2.261c., Jan. 2	2.211c., Apr. 16		\$23.44, Dec. 23	\$22.61, Jan. 2			\$22.00, Jan. 7	\$20.00, Feb. 11		
1940.....	2.286c., Jan. 3	2.236c., May 16		22.61, Sept. 19	20.61, Sept. 12			21.83, Dec. 30	16.04, Apr. 9		
1939.....	2.512c., May 17	2.211c., Oct. 18		23.25, June 21	19.61, July 6			22.50, Oct. 3	14.08, May 16		
1938.....	2.512c., Mar. 9	2.249c., Jan. 4		23.25, Mar. 9	20.25, Feb. 16			15.00, Nov. 22	11.00, June 7		
1937.....	2.249c., Dec. 28	2.016c., Mar. 10		19.74, Nov. 24	18.73, Aug. 11			21.92, Mar. 30	12.92, Nov. 10		
1936.....	2.062c., Oct. 1	2.056c., Jan. 8		18.84, Nov. 5	17.83, May 14			17.75, Dec. 21	12.67, June 9		
1935.....	2.118c., Apr. 24	1.945c., Jan. 2		17.90, May 1	16.90, Jan. 27			13.42, Dec. 10	10.33, Apr. 29		
1934.....	1.953c., Oct. 3	1.792c., May 2		16.90, Dec. 5	13.56, Jan. 3			13.00, Mar. 13	9.50, Sept. 25		
1933.....	1.915c., Sept. 6	1.870c., Mar. 15		14.81, Jan. 5	13.56, Dec. 6			12.25, Aug. 8	6.75, Jan. 3		
1932.....	1.981c., Jan. 13	1.883c., Dec. 29		15.90, Jan. 6	14.79, Dec. 15			8.50, Jan. 12	6.43, July 5		
1931.....	2.192c., Jan. 7	1.962c., Dec. 9		18.21, Jan. 7	15.90, Dec. 16			11.33, Jan. 6	8.50, Dec. 29		
1930.....	2.236c., May 28	2.192c., Oct. 29		18.71, May 14	18.21, Dec. 17			15.00, Feb. 18	11.25, Dec. 9		
1929.....								17.58, Jan. 29	14.08, Dec. 3		

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on averages for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

PASSAGE of the lend-lease bill will be followed by the placing of a considerable number of British-aid contracts, for which steel requirements are estimated at 3,000,000 to 4,000,000 tons.

Meanwhile, a flood of forward buying both for defense and non-defense requirements has been piling up backlogs of such huge amounts and extending so far into the future that the situation can scarcely be untangled except by some form of Government intervention.

The Priorities Board has refrained from issuing mandatory priorities even in commodities such as aluminum, zinc and nickel, where the supply situation is much more critical than in steel, preferring to let each industry work out its own delivery problems by some method of self-imposed rationing to non-defense consumers. Government requests to expedite shipments for defense projects continue to take the form of "preference ratings."

In one steel product, stainless steel, output of which is affected by the nickel shortage, supplies are now being rationed. Some mills are unable to accept orders from commercial users. As tight situations develop in other steel products, a similar plan will probably be followed whereby those unable to get preference ratings will have to accept partial shipments.

FROM the beginning of this surge of buying, steel companies have insisted that there would be enough steel to go around provided buying was done in orderly manner. Now, however, the situation has reached a point where preference ratings probably will come into the picture to a greater extent each week. Some manufacturers who would be far down on the list have been journeying to Washington in an effort to obtain a preference classification.

Steel sales in January having been well above those of December, the upward trend of last month, has been continued into this month. In some products the mills are almost entirely sold out for second quarter and are booking orders for third quarter and even to the end of the year.

Into this tight situation comes a larger volume of defense orders, some of which are being speeded up. For example, the Government 200-ship program was not expected to require steel before July, but 500,000 tons, mostly plates, now being allocated call for shipments to begin in March and to continue for 10 months. Construction of these boats is to run concurrently with the 60 ships ordered by the British, who took an option that will probably be exercised on 60 additional boats.

Within the next 60 days orders for about 500,000 tons of shell steel are expected. Some railroads are pressing for rail shipments that were not scheduled

• Steel required for new British contracts under lend-lease bill will total 3,000,000 to 4,000,000 tons . . . Flood of steel buying is piling up huge backlogs and greatly complicating steel delivery situation . . . More preference ratings expected.

until later, and car builders are trying to speed up deliveries of steel to turn out cars faster. The automobile and refrigerator industries and many other consuming lines are taking steel at a high rate. On top of these developments, there has been an accelerated demand for pipe and tin plate, two products that have been lagging behind the others. Cold reduction tin mills are running at 85 per cent, a rate higher than in many months, and pipe volume has expanded considerably. One pipe line order for 16,000 tons has been placed by the Southern Natural Gas Co. and another, involving 100,000 tons, has been awarded by the Natural Gas Pipe Line Co. of America.

The pressure on semi-finishing departments of steel plants is intense, forging billets being one of the items for which demand is increasing. Sheets are coming more into greater demand for defense projects. An order for 20,000 tons of hot rolled sheets for practice bombs is an example.

RECORDS were broken by January production and shipments. The output of 6,943,084 net tons of open hearth, Bessemer and electric steel ingots and castings last month was an all-time record and U. S. Steel's shipments of 1,682,454 net tons of finished steel products were the largest for any January in the history of the corporation and within 1 per cent of the previous high record in May, 1929.

Ingot production this week is estimated at 97 per cent, being still affected by furnaces out for repairs. Outlaw strikes last week caused a 48-hr. loss of time for 1000 workers at the Homestead plant of Carnegie-Illinois Steel Corp. and a 14-hr. loss for 3000 men at the McDonald mills of the same company.

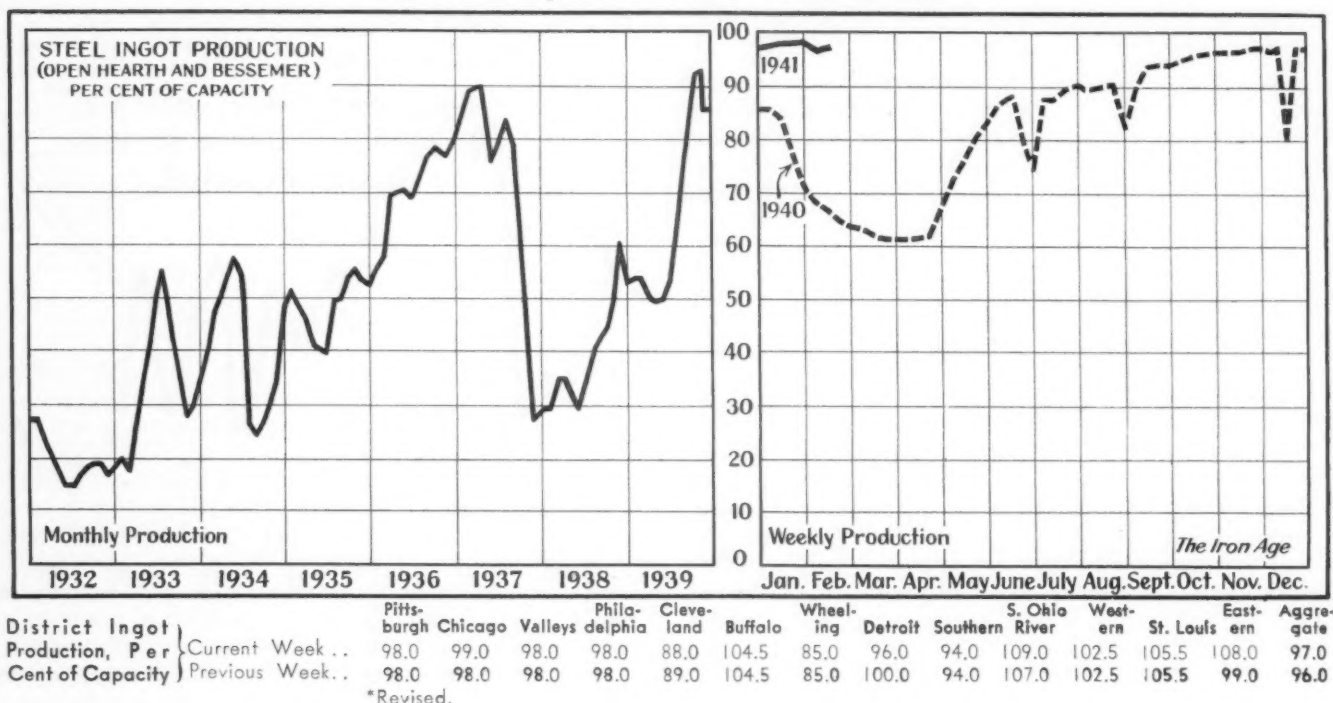
A \$5,000,000 expansion by the Columbia Steel Co., California subsidiary of U. S. Steel Corp., and a new plant to be built by American Rolling Mill Co. at Houston, Tex., with 200,000 tons annual capacity will aid the defense program. The Houston plant will utilize scrap, much of which until recently went to Japan.

The Industrial Pace . . .

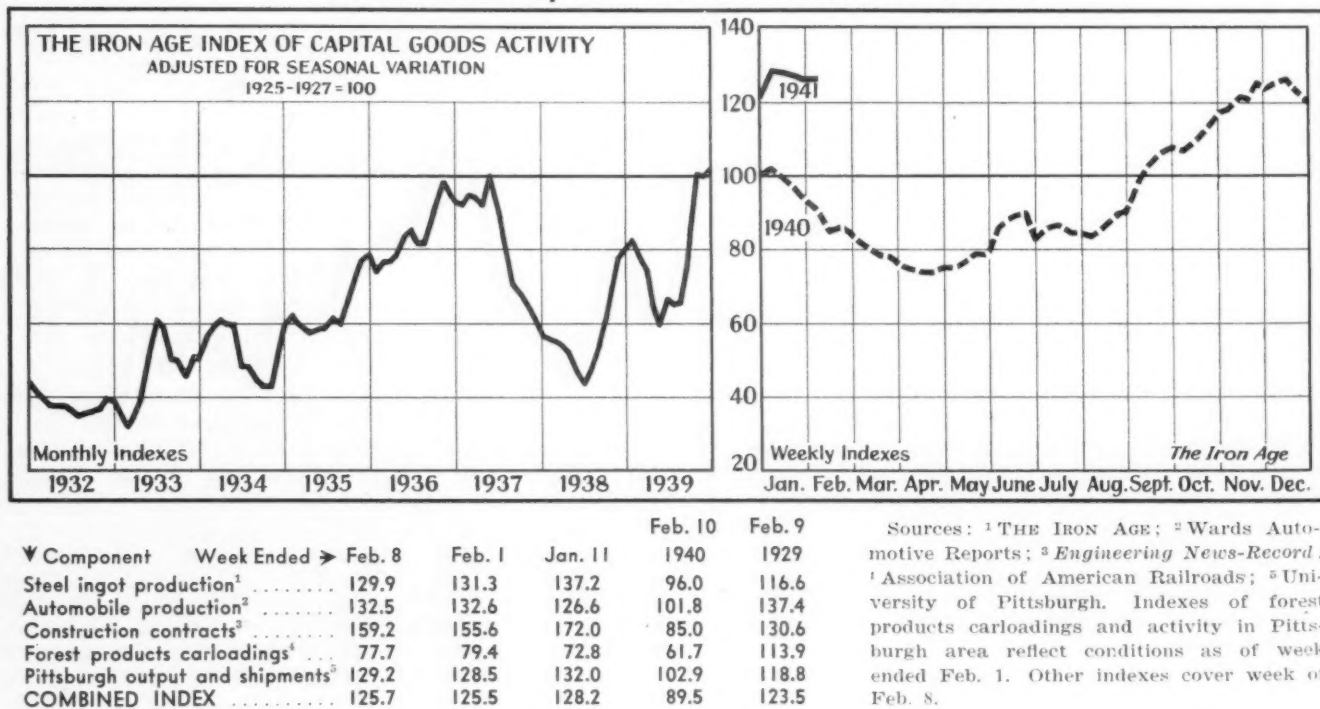
INCREASED ACTIVITY in two of the components of THE IRON AGE index of capital goods activity brought the recent sliding movement of the index to a halt in the past week. Standing at 125.7, the index compared with 125.5 in the preceding week, and 128.2 a month ago. Responsible for the gain was a rise in the heavy construction series and greater activity in the Pittsburgh district. Steel ingot production was off slightly on the basis of revised capacity figures. Lumber carloadings and automobile production rose less than seasonally.

HEAVY ENGINEERING CONSTRUCTION in January totaled \$584,549,000, 47 per cent above the December figure, \$398,704,000. Private awards were \$174,679,000, as compared with \$99,686,000 in December, while public projects rose to \$409,870,000 from \$299,018,000. Production of electric energy was up somewhat in December, totaling 13,455,880 kw-hr., 5.5 per cent above the November output of 12,750,815,000 kw-hr. Total revenue freight cars loaded in January was 2,740,095, only a small increase from the December total of 2,717,907.

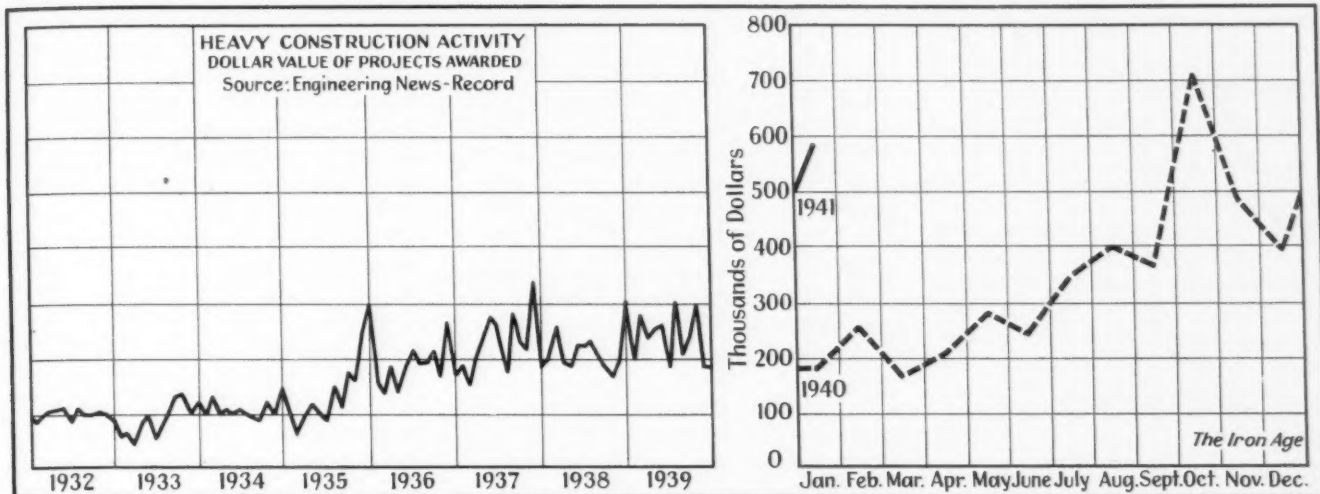
Steel Output at 97% This Week



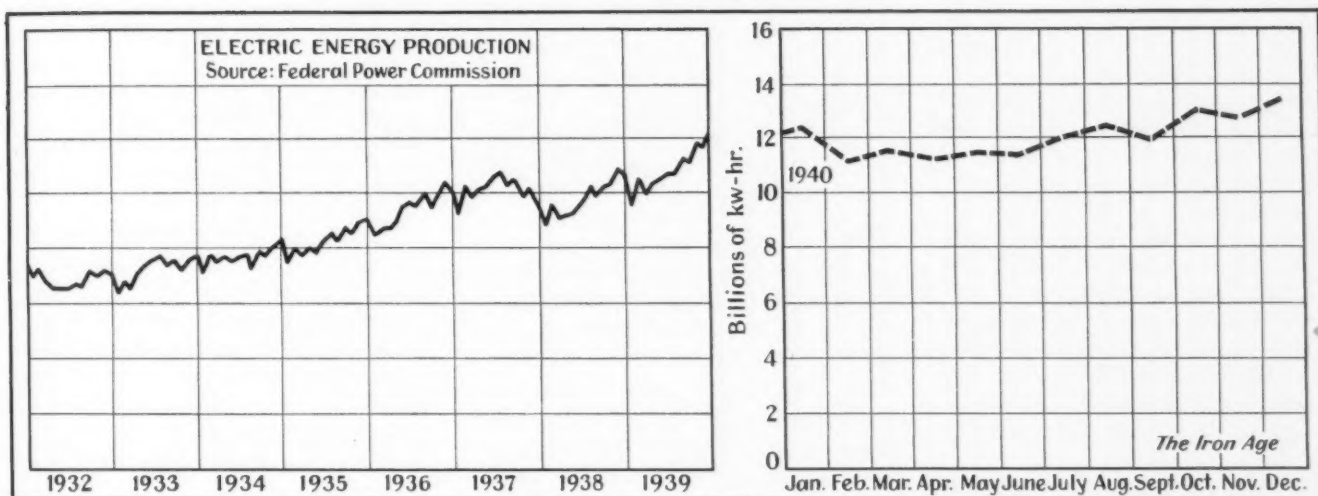
Decline In Capital Goods Index Checked



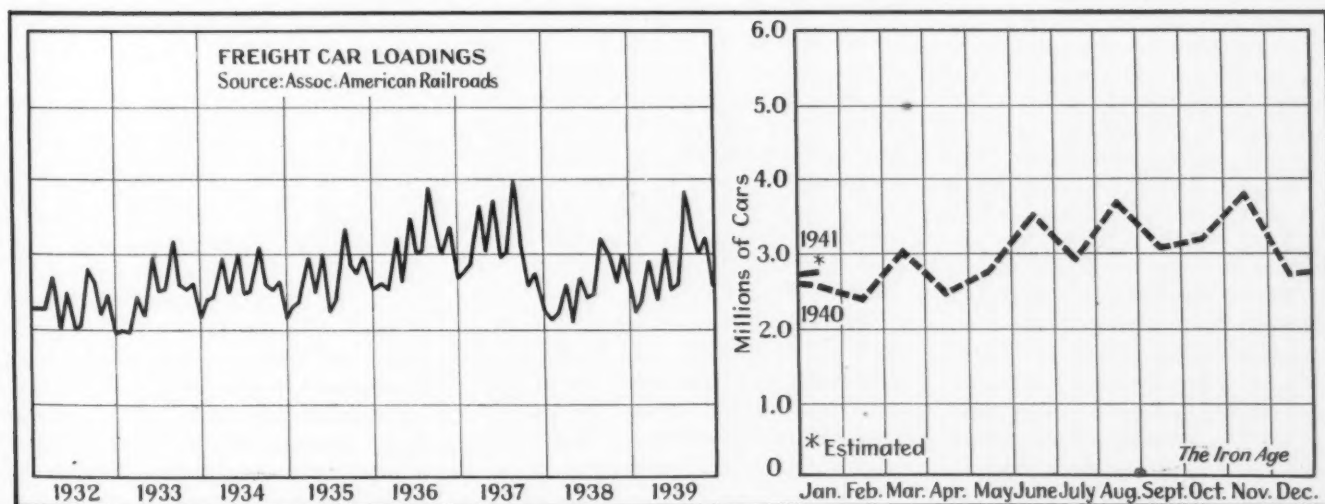
Engineering Construction Awards Up 47%



December Electric Energy Output Higher



January Carloadings Increase Slightly



Market News

...THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

... A flood of orders fills mills for months ahead

Representing every conceivable type of consumer and product, and with the automotive and refrigerator industries well represented, steel orders at PITTSBURGH in the past week constituted one of the heaviest weekly totals since the present upsurge began. Substantial increases were present in the flat rolled and pipe markets. Hot rolled product demand remained at record level. This showing was made at a time when foreign specifications had reached a temporary low point. Some companies have little room left on second quarter schedules and no small amount of business is being placed for third quarter delivery.

CHICAGO's steel picture is painted in one word—defense. Daily the flow of government orders to the Midwestern section grows bigger. This trend was responsible for some branch offices there reporting greater gains in January than any other part of the country. Estimates of the amount of defense business to total CHICAGO production are difficult to make. But considering all the indirect ramifications of the program defense business bulks very large.

New business there for the week was generally about 10 per cent ahead of the previous week and mills report orders well ahead of shipments. Alloy demand is heavy. Sheets are as active as plates and bars but sheet deliveries are better than the other two. Railroad demand is increasing, especially for car steel. Automotive buying holds to high levels. Mills find that buying is now more anticipatory than speculative. Deliveries lengthened again this week on some leading items as the defense program's impact gets heavier in those industrial areas served by CHICAGO producers.

Incoming specifications at CLEVELAND and YOUNGSTOWN are comparable to the early January volume, which means that order backlogs held by principal steel producers are still growing. Recent

features at CLEVELAND include a sharp revival in tin plate sales, a large pipe line award and some more railroad purchases. Around 500,000 tons of heavy steel, principally plates, are being allocated for the government's 200-ship program. (See details under Plates.)

Inquiries involving steel with nickel content for future shipment are being examined very closely and most producers are predicating acceptance upon the priority rating. Temporary difficulty has been experienced by non-integrated producers in obtaining billets with nickel content. Straight chrome stainless, used for trim on automobiles and other applications, will not be affected. Requirements of the defense program for stainless with nickel content have been rising. The Navy recently took bids on approximately 1000 tons of 2520 stainless welding wire.

Several leading steel producers are showing a disposition to curtail temporarily the production of steels which involve severe cropping of ingots. This conservation move may force consumers to modify their fabricating or manufacturing processes but will expedite steel production.

With Buffalo mills booked solidly for months in advance, steel producers there report no abatement in the flood of new orders. Mills now have "waiting lists" of customers which, on the basis of production time, is six to nine months long.

A slight decrease in the volume of bookings at BIRMINGHAM has been shortlived. Faced with extended deliveries and price in effect at time of shipment, buyers nevertheless are reported to be showing an increased desire to place orders. Bookings generally are running well ahead of record-smashing shipments. Demand for sheets has taken a sharp upturn during the past three weeks.

The heavy flow of orders for second quarter forced the leading interest in the Southern Ohio district to withdraw from the market temporarily to ascertain the effect of the deluge of business.

As the heavy week-to-week vol-

ume of fresh orders coming to eastern Pennsylvania mills continues to be limited by the caution of producers in preventing backlogs from becoming even more unwieldy, consumers have become a little more lenient in their demands and are cooperating more closely with mills as to delivery schedules. Many buyers are now specifying shipment through to the end of the year. Plates, sheets, structurals and bars figure prominently in new business.

Steel Operations

... Current rate is up one point to 97 per cent

January production of open hearth, Bessemer and electric steel ingots and castings totaled 6,943,084 net tons, a new high monthly record, as reported by the American Iron and Steel Institute and published in detail on another page of this issue. The monthly rate was 97.1 per cent.

This week's operations are estimated by THE IRON AGE at 97 per cent, up one point over last week. In some districts operations are still affected by the putting out of furnaces for repairs. These repairs are in some instances being made now rather than later so that production can be carried on at a peak next month, when it is expected that pressure for steel will assume even greater proportions than now.

On top of the production record reported by Bethlehem Steel Co. last week, two other companies have attained all-time peaks in output. Operating at 99 per cent during January, Republic Steel Corp. produced 672,729 net tons of steel ingots, greater than any previous tonnage since the company was organized in April, 1930. In October, 1940, production reached 626,056 net tons and in October, 1939, reached 589,121 net tons. Inland Steel Co.'s ingot production was at a new record high in January, being 297,381 net tons. This is at the rate of 108.1 per cent of capacity despite the fact that the company recently increased its rated annual capacity from 3,100,000 to 3,300,000 net tons.

Pig Iron

... Wickwire Spencer to rebuild a Buffalo furnace

An important expansion in Buffalo iron making capacity has been announced by the Wickwire Spencer Steel Co., which plans the immediate reconstruction of a blast furnace idle since 1929. This furnace, the company's second, will be ready to be blown in, it is expected, about June 1. The work will be done at a cost of approximately \$450,000 and will boost Wickwire's capacity to 320,000 tons of pig iron annually. This furnace, together with one now under reconstruction at the Hanna Furnace Corp. plant and a new blast stack being built at Bethlehem's Lackawanna plant will mean a total of 15 blast furnaces in the district, an increase of 25 per cent over 1940.

One steel making stack in the PITTSBURGH district is down for temporary repairs but is expected to start up again within two weeks. Excess supplies of steel making iron are nonexistent and some active inquiries which have been floating around for several weeks are still unsatisfied.

Believing the interest of all consumers can be served best by calm analysis of actual requirements, CLEVELAND sellers are slow to commit themselves definitely upon some of the heavy inquiries for future delivery occasionally being presented. Stocks at furnaces are still providing valuable assistance in helping to cushion the present strong demand. Simplification of analyses, a valuable aid in relieving the pressure upon sellers, is proceeding steadily.

No announcement of a price advance by the other two major merchant iron producers at BIRMINGHAM has followed last week's stated policy by the district's third major melter to increase prices \$1 a ton.

Considerable iron was contracted for in the past week by EASTERN PENNSYLVANIA consumers for second quarter delivery at prices then in effect. Since shipment of a good part of the orders recently taken cannot be made before the second period, indications are that supplies will by no means be abundant when books are opened. Current shipments have in some cases been made

in less than carload lots to tide over small buyers. Pipe makers have taken a substantial part of recent shipments. A New England furnace has been reported offering iron in eastern Pennsylvania at \$5 above the market there, or just enough more to cover the freight rate.

The Mystic Iron Works management has not yet decided about blowing out the stack. Chances are the furnace will operate through at least February.

Iron Ore

... Ford places orders with seven mining companies

Ford Motor Co. has placed with seven iron ore mining companies its requirements for 1941. Bids were received by Ford on Jan. 20. The aggregate tonnage was well over 300,000 tons, covering a wide range of grades. The Ford inquiries representing the principal open-market activity in the iron ore industry each year are followed with great interest. In addition to a number of the smaller independent mining companies, it is understood Oliver Iron Mining Co., subsidiary of United States Steel Corp., participated in the tonnages. Last year the Oliver company entered the open market for the first time, its initial sale being to Ford.

With 1941 ingot production expected to hit around 80,000,000 net tons, ore producers are experiencing unprecedented inquiries.

Production schedules of most mining companies in the Lake Superior ore district are unusually heavy due to increased demand from regular customers. Steps have been taken toward further standardization of grades for blast furnace use, a move which is expected to expedite ore loading at Upper Lake ports. Stock piles at washing plants are very large, providing another aid toward speeding up the movement of ore. Trucking operations at the mines, which eliminate the necessity for laying track, will reach a new peak this year.

Semi-Finished Steel

*... Exceedingly tight situation
... Heavy demand for forgings*

Because of British requirements and further upsurge in domestic demand, tightness in rerolling billets and sheet bars is the worst in steel industry history. All specifications are being scrutinized closely and only absolute requirements are being taken care of. Tremendous upsurge in demand for flat rolled products has increased the pressure for supplies from non-integrated steel makers.

Pressure to obtain forging quality steel in the CLEVELAND and YOUNGSTOWN districts is intense. Producers are making every effort to supply sufficient quantities to keep forge shops operating, but the building up of consumer inventories is being discouraged. Shortages of rerolling billets have served to intensify the demand for forging quality.

Preparing to ship ingots and billets to England, the Carnegie-Illinois Steel Corp.'s Pencoyd plant at Philadelphia lit three of 10 open-hearth Monday. Beginning at 10,000 tons the first month, output will be stepped up to 20,000 tons.

Railroad Buying

... January awards of 14,210 cars highest in years

With 14,210 domestic freight cars placed on order in January against 272 cars in January, 1940, last month's experience represents the largest number of cars booked in any period in recent years. Approximately 2560 cars are still pending. This week's orders amount to 27 locomotives, 100 freight cars and 4466 tons of rails.

Chesapeake & Ohio plans to award eight freight locomotives immediately to Lima Locomotive Works, in addition to the 14 bought there recently. The C. & O. will also award 35 flat cars and 20 standard steel passenger coaches.

Southern Pacific has placed orders for 15 diesel-electric switching locomotives as follows: Eight 600-hp. units to the Electro-Motive Corp., five 660-hp. units to the American Locomotive Co., and two 600-hp. units to the Baldwin Locomotive Works.

Detroit, Toledo & Ironton awarded four freight locomotives to Lima Locomotive Works.

Bethlehem Steel Co. will construct 100 gondola cars for its Sparrows Point, Md., plant.

Erie has ordered 4156 tons of rails from the Carnegie-Illinois Steel Corp. and 310 tons from Bethlehem.

Minneapolis, St. Paul & Sault Ste. Marie has asked the federal district court for permission to purchase 50 ballast cars from the American Car & Foundry Co. and 100 flat cars from the Pullman-Standard Car & Mfg. Co. Illinois Terminal Railroad is asking for authority to buy 250 all steel box cars of 50 ton capacity from the American Car & Foundry Co.

Minneapolis & St. Louis is inquiring for 75 auto box cars and the Norfolk & Western for 15 coaches.

Delivery is now more important than reciprocity and railroads are giving carbuilders much wider latitude in their purchases of steel and accessories.

Merchant Bars

... Bar orders still point upward ... Sales for third quarter

Following a period when little or no increases occurred in hot rolled bar demand, specifications within the past week at PITTSBURGH are again pointed upward. Deliveries are further extended and backlogs have been swelled. Practically every type of bar consumer is represented on order books. Some specifications being entered are for consumption in the third quarter. Automotive centers are buying heavily. The upsurge in demand for cold finished bars continues and the alloy bar delivery situation remains as tight as ever.

Carbon and alloy bar demand at CHICAGO causes delivery promises to be pushed back slightly again. Buying comes from every direction—an automotive source took 5000 tons last week from one mill; tractor and tank makers specify steadily; shell orders provide a weekly call. Orders are well ahead of ship-

ments and most mills there have mounting backlogs.

Large size bar mills at CLEVELAND and YOUNGSTOWN are now the most extended on deliveries. This very unusual situation has been caused by heavy demand for shell steel. Although output of all mills is at a high point, production is exceeded by new tonnage being received for future shipment.

Reinforcing Steel

... Awards total 13,570 tons, inquiries 6160 tons

Reinforcing steel awards of 13,570 tons include 6000 tons for 456 additional storage buildings for an ammunition loading plant at Ravenna, Ohio; 1553 tons for the Thames River Bridge between Groton and New London, Conn., and 1075 tons for a du Pont de Nemours plant at Charlestown, Ind.

New reinforcing steel projects total 6160 tons. The only sizable inquiry is 2500 tons for the Union Square Garage at San Francisco.

Wire Products

... Considerable activity in rod sales

Pittsburgh reports an increase in total wire bookings with considerable activity in wire rod sales. Manufacturers' wire demand reflects the high level of automotive operations as well as the general business picture.

Bolts, Nuts and Rivets

... Inquiries have tapered perhaps only temporarily

Although some manufacturers at CLEVELAND report inquiries have tapered during the past week, the development has created no concern and appears to arise from the fact that it is not yet time for quarterly automotive inquiries to develop. The auto makers will be active again late this month or early in March. Bolt and nut and cap screw producers are finding it increasingly difficult to obtain special steels, particularly where spheroidizing is required. So far no serious trouble has been caused, as nearly as can be ascertained.

Money in the Bank!



GUSHER COOLANT PUMP

Manufacturers using Gusher Coolant Pumps do not carry repair parts in stock because they hardly ever need them. There you have a practical example of satisfactory operation of a product that leaves money in the bank instead of tying it up in stock room repair parts.

Gusher Coolant Pumps can be throttled down to a trickle or opened up to a gusher, providing just the flow of coolant your operations require regardless of machine speeds. Write us for full information about these efficient impeller - type coolant pumps!

The RUTHMAN Machinery Company

CINCINNATI OHIO

Tubular Goods

... Pipe now feeling effects of steel buying rush

Accelerated buying, which involves forward purchases, has hit the pipe market within the past two weeks. Tubular sales for months past failed to display the tense activity present in other markets. However, PITTSBURGH reports a substantial increase in oil country goods specifications as some oil companies become apprehensive over subsequent availability of supplies. Line pipe tonnages, substantial in the aggregate, have been placed in the past 10 days and for the most part include a fair number of small looping or tie-in lines averaging between 35 and 40 miles each.

An 800-mile line of 24 in. pipe taking about 100,000 tons of steel for the Natural Gas Pipe Line Co. of America will be furnished by the A. O. Smith Corp., Milwaukee. The line will run from Texas to Chicago.

Southern Natural Gas Co. has ordered 135 miles of 14-in. pipe involving about 16,000 tons of steel. The order was divided between National Tube Co. and Republic Steel Corp. These are the largest pipe line orders to be placed in some time, but with the Federal Government beginning to exert pressure for the establishment of more oil lines to serve the defense program, the market may be unusually active later this year.

PITTSBURGH also reports continued activity in merchant pipe, some of which is ascribed to national defense needs. Stocks of standard pipe in jobbers' hands are higher than a month ago but material is moving briskly to consumers. At CLEVELAND and YOUNGSTOWN pipe orders are exceptionally heavy.

Plates

... Allocation of 500,000 tons for 200-ship program

Allocation of 500,000 tons of steel, mostly plates, for the United States Government's 200-ship program has been begun. Carnegie-Illinois and Bethlehem will furnish the bulk of the material, but it will be spread out among a number of other producers, depending upon the proximity of their plants to the

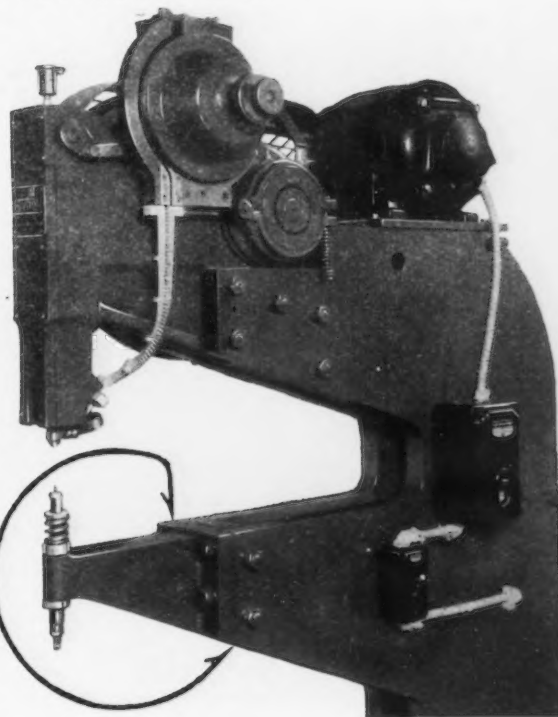
various shipyards to be established. Originally the shipping of steel for these boats was to have been started about July 1, but the program is being hastened, and deliveries are now scheduled to start in March and to be completed in 10 months. The schedule calls for the completion of the 200 boats within 20 months. They will be built concurrently with the 60 ships which the British recently ordered.

The British took an option on 60 additional boats, and it is understood that this option will now be exercised.

Owing to the tight situation in extremely wide plates, the bulk of the plates for these ships will be not over 90 in. Even so, the steel mills are having difficulty in arranging shipping schedules. Some commercial users will probably find that their orders for forward de-

for more solid rivet joints per RIVITOR

(minimized change-over time)



Sustained production with but small loss of time for "change-overs," is possible with this "Inter-changeable Horn Type" RIVITOR.

Complete horn sections, carrying the anvil mechanism, may be transferred to another Rivitor (this type) which has the required throat depth to get the next rivet locations.

This not only permits maximum machine utilization but also accommodates more automatic feed riveting without having to have additional complete machines. At the same time, the deep throat machines can be kept busy with work requiring that accommodation. Information on these and the other type Rivitors will be sent promptly, address The Tomkins-Johnson Co., 628 N. Mechanic Street, Jackson, Michigan.

THIS IS A TOMKINS-JOHNSON RIVITOR

livery will be delayed beyond the time originally promised.

The Maritime Commission's ship-building program will also be speeded up.

The Bethlehem Steel Co. submitted a figure of \$3,592,967 and the United States Export Steel Corp. a bid of \$3,635,559.61 on approximately 28,000 tons of 3-in. steel plates together with miscellaneous lots of bolts and spare parts for Panama Canal at an opening

in Washington on Monday. Bethlehem deliveries would begin May 21, 1941, and be completed Jan. 7, 1942, while the United States Export Steel deliveries would begin May 30, 1941, and be completed Jan. 15, 1942.

High speed mills at PITTSBURGH are turning out far more plate tonnage than was believed possible a year ago. Incoming orders, however, continue ahead of production, plate backlogs are heavy and de-

liveries remain extended. Carnegie-Illinois Steel Corp.'s Homestead 100-in. plate mill lost at least 48 hours last week due to an outlaw strike involving wage grievances.

Plate fabricators in the CHICAGO district are working under boom time conditions. Widespread demand from almost every source—defense and general—is pushing backlogs higher. Sheared plates in the 84 to 150 in. sizes are in the tightest position. Railroad buying, tanks, some ship building, heavy machinery interests are furnishing a steady source of orders in that district.

Deliveries on all types of plates in EASTERN PENNSYLVANIA now stand at from 16 to 35 weeks, with an ever-decreasing amount to be had near the shorter limit. A sheared plate maker who withdrew from the market recently has as yet given no indication of a possible return. Heavy orders coming from boiler and drum shops have pushed shipments of high-tensile material to 18 weeks. In the present situation mills are not anxious to accept new orders on most types, preferring to concentrate on production with a view to checking mounting backlogs, an effort which has met with little success so far.

Unprecedented demand for plates at BIRMINGHAM is being sustained in large part by mounting ship-building activity at Gulf ports. At least one mill in that district is booked up for the second quarter.

Sheets and Strip

... Second quarter mostly filled up, consumers buy for third

With most of the second quarter sold up on hot rolled sheets, some PITTSBURGH makers are taking business for third quarter delivery. Available space on second quarter cold rolled sheet schedules is rapidly being eliminated. Automotive purchases within the past 10 days have been substantial and in some instances car makers are setting up shipping schedules covering material for June and July operations. An avalanche of business is flowing in from refrigerator makers and miscellaneous flat rolled steel users. The flat rolled market has finally caught up to the tense conditions now prevailing in other products.

A CHICAGO producer received an

Speed up!



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PITTSBURGH
PLATE GLASS COMPANY
 BRUSH DIVISION • BALTIMORE, MD.

order this week for 20,000 tons of hot rolled sheets for use in practice bombs. Orders running from 5000 to more than 15,000 tons from automotive, railroad and electrical interests were among the chief items at one mill there.

CLEVELAND reports that total forward buying each week still exceeds shipments despite high production and the fact that not all the business offered to sellers is being accepted.

The scarcity of zinc has given rise to fears of a shortage of galvanized sheets.

The leading SOUTHERN OHIO mill has become so active, that the district was forced to withdraw from the market for several days last week to allow time to corrolate and analyze new business in the light of plant capacity.

Tin Plate

... Cold reduction mills now up to 85%

Tin plate specifications have again increased in volume and cold reduction mills are operating at approximately 86 per cent, up one point from a week ago. The trend is expected to continue upward.

Capacity production of tin plate has reached CHICAGO producers. One mill got an order last week for over 15,000 tons. The business comes from the regular canning sources, though in advance of the usual buying season.

Structural Steel

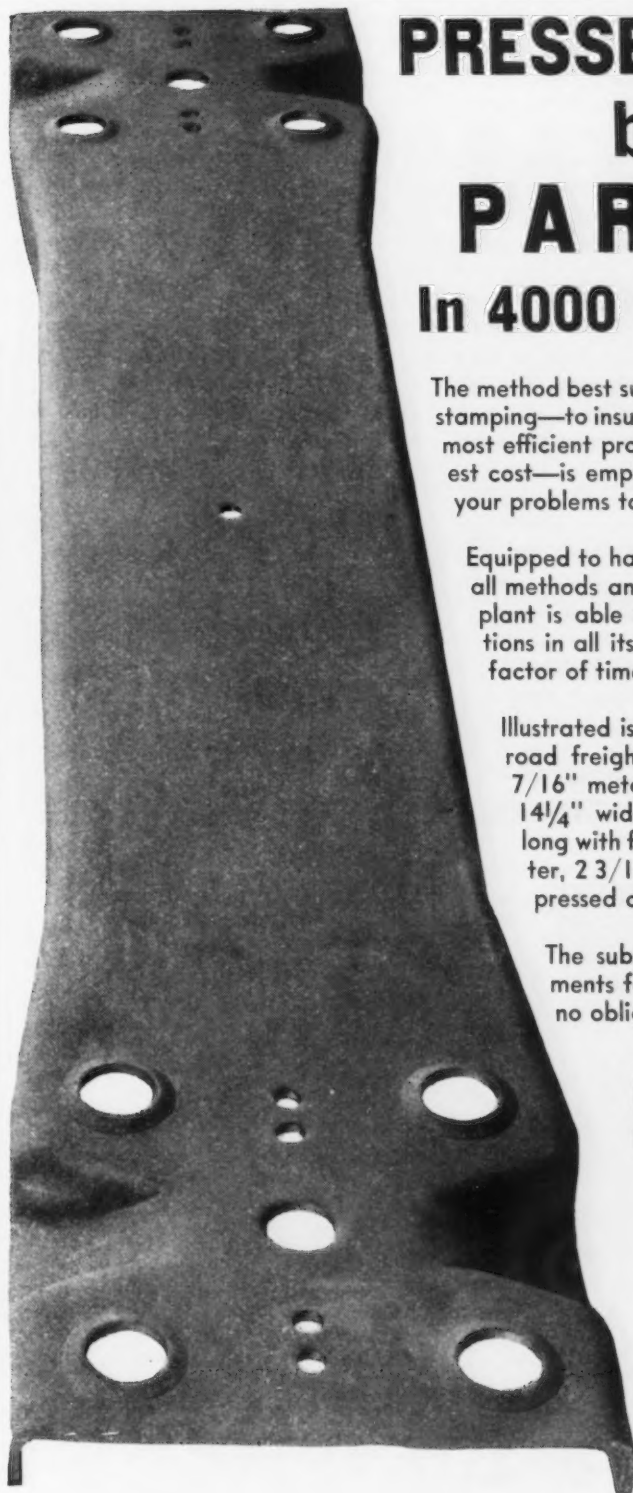
... Awards of 25,500 tons largely defense work

Fabricated structural steel lettings for the week total 25,500 tons, with the bulk of orders for defense work. The largest awards are 6000 tons for the Hudson Motor Car Co.'s gun plant at Detroit; 4500 tons for the North American airplane plant at Kansas City, Kan.; 3500 tons for a plant at Hatboro, Pa., for the Brewster Aeronautical Corp.; 1675 tons for a government storehouse at Norfolk, Va.; 1500 tons at Madison, Ind., for army buildings; 1300 tons at St. Louis for a plant for the Continental Can Co.; 1260 tons for a manufacturing building for

the Bullard Co., Bridgeport, Conn., and 1010 tons for fuse loading lines at Kingsbury, Ind.

New structural steel projects advanced to 33,655 tons from 26,950 tons last week. Sizable inquiries include 9000 tons at Melrose Park, Ill., for the Buick Aircraft engine plant, on which bids have been taken; 7000 tons at Dayman, Iowa, for 58 storage buildings for an ordnance plant; 3000

tons for pipe supports at the Elwood, Ill., ordnance plant; 2600 tons for additions and alterations in runways and shipways for the Cramp Shipbuilding Co., Philadelphia; 2300 tons for a Delaware & Hudson Railroad Co. bridge at Fort Edward, N. Y.; 1800 tons for a navy supply storehouse at Oakland, Cal., and 1000 tons for a chemical laboratory for Cornell University, Ithaca, N. Y.



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The method best suited for each particular stamping—to insure most effective results, most efficient production and most modest cost—is employed when you present your problems to the Parish plant.

Equipped to handle all types of work in all methods and sizes of stamping, our plant is able to meet your specifications in all its elements, including the factor of time.

Illustrated is a Spring Plank for railroad freight car trucks. Made of 7/16" metal—16 5/8" wide at ends, 14 1/4" wide at center, and 93 1/4" long with flanges 3 3/8" high at center, 2 3/16" high at ends—it was pressed cold from heavy steel.

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Machine Tools

... SALES, INQUIRIES AND MARKET NEWS

Used Tools to Be Leased at \$1 a Year

Chicago

• • • In cooperation with the national defense program, Louis E. Emerman & Co. has offered to lend defense contractors machine tools at a charge of only \$1 a year. "Used machinery dealers are particularly anxious to do their part in the preparedness program and this company is making this move in an effort to see that no equipment is held off from manufacturers who need it," said Mr. Emerman.

The Emerman firm will lease equipment at the \$1 a year price to any manufacturer who is performing direct defense work, provided this manufacturer can show that he has also ordered new equipment for the furtherance of defense work. Lessee must return machine at end

of year in same condition as he got it or pay for any repairs required.

Used machinery is being constantly shipped by the Emerman company to defense manufacturers even before sales price has been agreed upon. This is done so that defense work is not held up. Countless plants have been using the resources of used machinery dealers in locating sound equipment which can be obtained quickly for defense building.

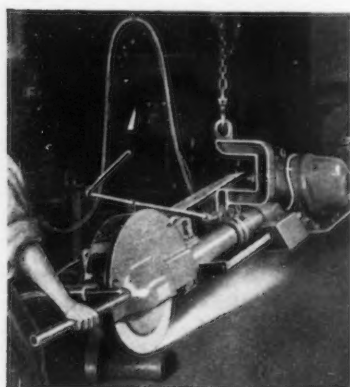
The \$1 a year lease plan has grown out of a government order that Emerman cease shipments to British and United States defense manufacturers on the charge that prices were too high. However, dealers have been charging prices verbally agreed upon at meetings in Washington and Emerman contends that his prices have been in line with that agreement. As proof of

the intention of furthering the defense program, the offer has been made to lease sound, used equipment provided the manufacturer has a priority rating which shows he is involved in the preparedness program.

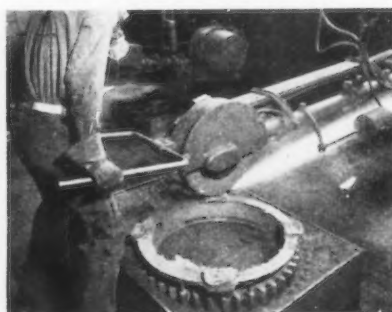
The effect of the priority letter to machine tool manufacturers has been one of the jitters on the part of many "border-line" buyers and on the dealers who have been placed in the middle. Those customers whose business is not strictly defense or who have defense business on a subcontracting basis are considerably worried about the delivery of equipment on order. A frantic effort is being made to establish priority ratings, and all interests concerned are working with the Chicago Ordnance district office in the hope that establishment of ratings will be left to the district offices where local conditions are better known.

Speed Work and Save Money

with a Modern Marschke
SWING FRAME GRINDER



Ask for information on Marschke Pedestal and Floor Stand Grinders and Buffers—from 1 to 25 HP; 10" to 30" wheels.



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Not with a Marschke Swing Frame Grinder, for the Marschke takes the wheel to the work. These well balanced machines spare the operator. Their smooth, true spindle rotation accounts for long wheel service. They are convenient, productive, economical and safe.

There's a Marschke Swing Frame Grinder or Buffer for every requirement—from 3 to 15 HP; from 12" to 24" wheels. For detailed facts call on your local Marschke representative, or write for catalog to VONNEGUT MOULDER CORP., 1843 Madison Ave., Indianapolis, Ind.

★ THE MARSCHKE ★ LINE

Production of Tools Rising At Cleveland

Cleveland

• • • Production is still rising here and a particularly large gain will be made next month. Meanwhile, orders are being placed by a number of large buyers, including Thompson Products, Eaton and Cleveland Pneumatic, all in the aircraft parts business. At the same time it is interesting to note that several trade schools are placing orders and claim they can obtain the necessary priorities. One school will spend around \$100,000 according to present plans.

Difficulty is still encountered by the machine tool industry in obtaining accurate data on whether the extra output of contemplated expansions would be actually needed.

One large national press builder reports that January was probably the largest month on orders since 1929, and perhaps in the history of the company. Cartridge case plants in the West are among the biggest prospects for this type of business.

Non-Ferrous Metals

... MARKET ACTIVITIES AND PRICE TRENDS

New York, Feb. 11—Noteworthy features of the non-ferrous markets in the past week included the setting up by the Metals Reserve Co. of the committee to handle the allocation of the 200,000 tons of South American copper purchased by the former organization. Satisfaction of immediate requirements arising out of the national defense program will be the primary objective of the committee. In the lead market prices were advanced \$3 a ton in the first change since the latter part of November. Interest in the zinc market centered around initial moves by the priorities board to differentiate between essential and non-essential uses for zinc, as it related to the defense effort. Mine producers allocated very good tonnages of electrolytic copper in the past week at the unchanged prices of 12c. a lb., delivered Valley. Deliveries in most cases ran well forward but, in spite of rigid allocation policies, some material was still available for nearby shipment. Custom smelters adhered to the 12.50c. level, although not much metal appears available before May. The export market was quiet at 10.375c. to 10.50c., f.a.s.

Lead

Believed due in large part to the fact that at the old price level the inflow of foreign lead was not taking care of a large enough share of a sustained and fairly heavy demand characterizing the market recently, prices were advanced on Monday of this week to 5.65c. a lb., delivered New York. Consumer inquiries, which had not been markedly strong in the previous period, returned in their former volume in the past week, hastening the rise. The new level is expected to make foreign metal available in the desired volume. Sellers reported exceptionally good business immediately following the advance, quotas in some cases being filled early in the day. March requirements have been about 50 per cent filled, while February still has somewhat less than 5 per cent to go.

Zinc

Stocks of slab zinc declined to an all-time low of 8768 tons at the end of January, monthly statistics show. This tonnage constituted a decline of 32 per cent from the 12,884 tons on hand at the end of December, and compared with 63,532 tons in January, 1940. Production in the month fell off slightly to 59,156 tons from 59,883 tons in December, in spite of the fact that facilities are being pushed to the utmost. Shipments also fell below the December total, being 63,272 tons, as against 65,385 tons. Pending further developments in Washington the market proceeds in the same fashion with routine allocations being made on the basis of 7.64c. a lb., delivered New York. Diversion of zinc from non-defense uses is currently the primary purpose of the Priorities Board. Sales

in the past week totaled 3682 tons, almost precisely the same as in the previous week. Shipments were off slightly to 5657 tons, while unfilled orders were down further to 116,200 tons.

Tin

Dullness continued in the past week and the market declined from 50.35c. to 50.25c. a lb., delivered New York, entering the current week at that level. Only business done was with small consumers, who are interested in paying more than the government buying price only when prompt shipment on small lots is needed. For futures 50.15c. is being asked. On Monday war risk insurance rates covering shipments from the Far East were reduced $\frac{1}{4}$ to $\frac{1}{8}$ per cent, a change of only minor importance to the importers.

"SET-UP" JUST ONCE FOR a minimum of 24 positions necessary for down-hand welding.

Put an assembly on a C-F Positioner and you can turn it and tilt it to reach every welding spot on top, bottom and sides. This economy of handling means definite savings in welders' time, in crane service and it means better welding procedure, too. Why not investigate this new, easy and safe production method today? Send the coupon.



C-F Positioners are available in capacities from 1200 lbs. to 14,000 lbs. C-F Positioners are made in hand and motor driven models with various controlling features and installation arrangements to suit every requirement.

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1303 S. KILBOURN AVE. CHICAGO, ILLINOIS

Scrap

... MARKET ACTIVITIES AND QUOTATION TRENDS

Pittsburgh

From 15,000 to 18,000 tons of scrap involving No. 1 and No. 2 heavy melting steel has been sold into consumption within the past week. No. 1 steel was sold at \$21 and No. 2 at \$20 a ton. More than one consumer sale was involved. Brokers are having extreme difficulty covering on this material. Exceptionally small quantities are being picked up by brokers at \$20.50 for No. 1, but in other instances \$21 a ton is being paid to cover. This district is still being penalized because of the close proximity of quotations in other districts to prices being quoted here. The result is that scrap is hardly moving to this district from outlying points. Although major scrap grades such as No. 1 and No. 2 steel have been declining consistently, many secondary grades have either stayed at the same levels or have actually increased in price.

Chicago

Scrap interests here find the market has a strange air of quiet. Though the entire market is very strong with demand and consumption at a peak, price changes are infrequent. No. 1 heavy melting steel remaining unchanged at \$19 to \$19.50. Material is tight, although no shortage has developed, nor is one likely. Prices are governed by desire to cooperate with Federal wishes, but the situation is somewhat confused.

Philadelphia

In the absence of sales into consumption, all prices in the past week remained unchanged with No. 1 steel quoted at \$20. Cold weather is still interfering somewhat with shipments. The flow of scrap into the district is far from abundant and, although supplies are ample to support mill operations for the present, buyers and sellers are watching the market very closely and not without some uneasiness. The long-idle Pencoyd plant has been accepting shipments regularly.

Youngstown

Shipments of scrap to Youngstown and nearby cities are reported ample at present. Up to the start of this week the amount of new sales into mill consumption had been rather light. No. 1 heavy melting steel is still quoted at \$21 to \$21.50 a ton, unchanged from last week.

Cleveland

Moderate activity in the general vicinity of prevailing quoted prices features the market on open hearth grades here. Considerable confusion and differences of opinion have been noted in certain departments. It is said collections by small dealers have fallen off recently. No. 1 heavy melting is unchanged this week at \$20 to \$20.50.

Buffalo

Sale of about 10,000 tons of No. 2 heavy melting scrap within the quoted range is the first sale into consumption reported in this district in the last five weeks. The area's largest consumer still is holding out with a \$20 bid for No. 1 heavy melting scrap but dealers do not appear interested. Price readjustments this week include a \$1 boost for cast iron carwheels, a 50c. rise in the price of old hydraulic bundles and railroad malleable, and a drop of \$1 for low phosphate.

St. Louis

Heavy melting steel grades remain unchanged in St. Louis, although a few specialties were off another 50c. a ton. Steel mills are out of the market, and shipments are reported to be coming in fast, one plant being badly congested. A few scattered sales of specialties were reported.

Cincinnati

Old material dealers are still wrestling to keep prices stabilized at the government's request, but find scrap producers a trifle reluctant to accept the situation. As a result, bids remain unchanged, but available scrap is reported tight. All grades of material are moving on contract, but no exceptional new business is reported.

Birmingham

Scrap continues to move into this district at an accelerated pace. Considerable tonnages are being received from Gulf ports, where exports are practically non-existent. Prices are unchanged.

Detroit

It appears that not enough time has passed to remove from the market all interferences attributable to outstanding high priced orders. It is difficult to ascertain an exact price level but there has been no substantial change since a week ago. Activity is at a minimum, consistent with keeping going. There is no speculative activity and the only material being stored on docks for spring shipment is that forced there by circumstances. Only one grade, turnings, is being accumulated in this way. Within recent weeks a sale of 180 tons of old rails at \$20.60 a ton by the city of Toledo has been reported. The previous sale made two months earlier brought a price of \$17.50. The most recent sales, however, were made on the downward side of the price curve.

New York

There is a lack of uniformity in prices offered by brokers. Some are quoting No. 1 at \$15.50 to \$16.00, others are quoting 50c. above this range. There is general complaint that material is slow in coming out. A sale

of 2500 to 3000 tons of scrap at the New York Navy Yard yielded a price of \$13.96 a net ton f.o.b. yard.

Boston

Although less excited than immediately following Washington's edict for lower prices, the trade is still somewhat confused. Bundled skeleton or busheling sales at \$12.90 to \$13.15 a ton, f.o.b., signifies weakness. On the other hand, steel turnings were sold at \$9.15 to \$9.65 a ton, f.o.b., and subsequently at \$10 for Youngstown delivery, suggesting strength. The Washburn Wire Co., Phillipsdale, R. I., is buying No. 1 steel at \$17.25 a ton delivered, and No. 2 at \$15.75.

Toronto

Sustained heavy volume buying features scrap markets in this area, with consumers taking all offerings. Cast scrap has brisk calls with melters paying \$24.75 gross ton delivered Toronto; No. 1 heavy melting steel is active at \$16.50, delivered Hamilton, while turnings and borings are moving steadily to consumers at \$11 a gross ton delivered. The cast scrap situation is rather serious and supplies are well below demands, some dealers still offering 50c. above market for supplies to fill old contracts.

Trade Notes

Light Metals, Inc., Chicago, has been formed here for production of magnesium alloy castings. It is reported that the new firm has obtained a license from the Dow Chemical Co. A new building is under construction for the firm which has been formed by a group of local and New York business men.

Cleaver-Brooks Co., Milwaukee, maker of special oil-fired boilers and road construction equipment, including tank car heaters, asphalt mixing plants, booster pumps and dryers, is moving from its present quarters at W. Center and N. 32 Streets to larger factory space at 3220 W. Lancaster Street.

Republic Machinery Co., Toledo and Indianapolis, has been named distributor in those areas for the Sullivan Co.'s line of stationary compressors.

The C. Tennant & Sons Co., New York, has purchased a plant at Warren, Ohio, for its Griplock Division and will transfer its Farrell, Pa., plant equipment to the new location. The company manufactures locking metal straps for shipping containers.

B. F. Goodrich Co., Akron, Ohio, will expand its Koroseal production plant at Niagara Falls beyond the scope of the original plans, according to John L. Collyer, president of the company. Increasing demands for the synthetic material, stimulated by national defense needs, have made expansion necessary before the original production unit has been completed.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$20.50 to \$21.00
Railroad heavy mltng.	21.00 to 21.50
No. 2 heavy mltng.	19.50 to 20.00
Railroad scrap rails	24.00
Comp. sheet steel	20.50 to 21.00
Hand bundled sheets	19.50 to 20.00
Heavy steel axle turn.	19.50 to 20.00
Heavy steel forge turn.	18.50 to 19.00
Machine shop turnings	15.50 to 16.00
Short shov. turn. alloy free	16.00 to 16.50
Mixed bor. & turn.	15.50 to 16.00
Cast iron borings	16.50 to 17.00
Cast iron carwheels	22.50 to 23.00
Heavy breakable cast.	18.00 to 18.50
No. 1 cupola cast.	22.00 to 22.50
RR. knuckles & coup.	26.00 to 26.50
Rail coil springs	27.00 to 27.50
Rail leaf springs	27.00 to 27.50
Rolled steel wheels	27.00 to 27.50
Low phos. billet crops	27.00 to 27.50
Low phos. punchings	26.50 to 27.00
Low phos. heavy plate	25.50 to 26.00
Railroad malleable	25.50 to 26.00

PHILADELPHIA

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$20.00
No. 2 hvy. mltng. steel	18.50
Hydraulic bund., new	20.00
Hydraulic bund., old	17.00
Steel rails for rolling	\$25.00 to 26.00
Cast iron carwheels	23.00
Hvy. breakable cast.	22.00 to 22.50
No. 1 cupola cast.	23.50 to 24.00
Mixed yard (f'd'y) cast	20.50
Stove plate (steel wks.)	19.00 to 19.50
Railroad malleable	23.50 to 24.00
Machine shop turn.	14.50
No. 1 blast furnace	14.00
Cast borings	16.00
Heavy axle turnings	19.50
No. 1 low phos. hvy.	26.00 to 26.50
Couplers & knuckles	26.00 to 26.50
Rolled steel wheels	26.00 to 26.50
Steel axles	25.00 to 25.50
Shafting	25.00 to 25.50
Spec. iron & steel pipe	18.00 to 18.50
Cast borings (chem.)	16.00

CHICAGO

Delivered to Chicago district consumers:	
Per Gross Ton	
Hvy. mltng. steel	\$19.00 to 19.50
Auto. hvy. mltng. steel alloy free	18.00 to 18.50
No. 2 auto. steel	16.00 to 16.50
Shoveling steel	19.00 to 19.50
Factory bundles	18.50 to 19.00
Dealers' bundles	17.00 to 17.50
No. 1 busheling	18.00 to 18.50
No. 2 busheling, old	10.50 to 11.00
Rolled carwheels	22.50 to 23.00
Railroad tires, cut	23.00 to 23.50
Railroad leaf springs	22.50 to 23.00
Steel coup. & knuckles	22.50 to 23.00
Axle turnings	18.25 to 18.75
Coil springs	24.00 to 24.50
Axle turn. (elec.)	19.75 to 20.00
Low phos. punchings	23.00 to 23.50
Low phos. plates 12 in. and under	22.50 to 23.00
Cast iron borings	13.50 to 14.00
Short shov. turn.	14.00 to 14.50
Machine shop turn.	13.50 to 14.00
Rerolling rails	23.50 to 24.00
Steel rails under 3 ft.	23.00 to 23.50
Steel rails under 2 ft.	23.50 to 24.00
Angle bars steel	22.50 to 23.00
Cast iron carwheels	20.00 to 20.50
Railroad malleable	24.25 to 24.75
Agric. malleable	17.50 to 18.00
Per Net Ton	
Iron car axles	\$23.50 to \$24.00
Steel car axles	24.00 to 24.50
Locomotive tires	18.00 to 18.50
Pipes and flues	14.00 to 14.50
No. 1 machinery cast.	19.00 to 19.50
Clean auto. blocks	18.00 to 18.50
No. 1 railroad cast.	17.50 to 18.00
No. 1 agric. cast.	16.50 to 17.00
Stove plate	13.00 to 13.50
Grate bars	14.00 to 14.50
Brake shoes	14.25 to 14.75

YOUNGSTOWN

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$21.00 to \$21.50
No. 2 hvy. mltng. steel	19.50 to 20.00
Low phos plate	24.00 to 24.50
No. 1 busheling	20.00 to 20.50
Hydraulic bundles	20.50 to 21.00
Machine shop turn.	14.00 to 14.50

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$20.00 to \$20.50
No. 2 hvy. mltng. steel	19.00 to 19.50

Comp. sheet steel	\$19.50 to \$20.00
Light bund. stampings	15.00 to 15.50
Drop forge flashings	18.00 to 18.50
Machine shop turn.	12.50 to 13.00
Short shov. turn.	14.00 to 14.50
No. 1 busheling	19.25 to 19.75
Steel axle turnings	19.50 to 20.00
Low phos. billet and bloom crops	24.50 to 25.00
Cast iron borings	14.00 to 14.50
Mixed bor. & turn.	14.00 to 14.50
No. 2 busheling	14.00 to 14.50
No. 1 machinery cast.	22.00 to 22.50
Railroad cast	21.00 to 21.50
Railroad grate bars	15.00 to 15.50
Stove plate	15.00 to 15.50
Rails under 3 ft.	24.50 to 25.00
Rails for rolling	25.50 to 26.00
Railroad malleable	24.00 to 24.50

BUFFALO

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$20.50 to \$21.00
No. 2 hvy. mltng. steel	18.50 to 19.00
Scrap rails	22.00 to 22.50
New hvy. b'ndled sheets	18.00 to 18.50
Old hydraul. bundles	17.00 to 17.50
Drop forge flashings	18.00 to 18.50
No. 1 busheling	18.00 to 18.50
Machine shop turn.	13.50 to 14.00
Shov. turnings	15.00 to 15.50
Mixed bor. & turn.	14.00 to 14.50
Cast iron borings	14.00 to 14.50
Knuckles & couplers	25.00 to 25.50
Coil & leaf springs	25.00 to 25.50
Rolled steel wheels	25.00 to 25.50
No. 1 machinery cast.	21.00 to 21.50
No. 1 cupola cast.	19.50 to 20.00
Stove plate	17.00 to 17.50
Steel rails under 3 ft.	26.50 to 27.00
Cast iron carwheels	19.50 to 20.50
Railroad malleable	24.00 to 24.50
Low phos. plate	26.00 to 26.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:	
Selected hvy. melting	\$18.00 to \$18.50
No. 1 hvy. melting	17.50 to 18.00
No. 2 hvy. melting	16.50 to 17.00
No. 1 locomotive tires	19.50 to 20.00
Misc. stand. sec. rails	19.50 to 20.00
Railroad springs	21.50 to 22.00
Bundled sheets	12.50 to 13.00
Cast bor. & turn.	11.00 to 11.50
Machine shop turn.	10.75 to 11.25
Heavy turnings	13.50 to 14.00
Rails for rerolling	22.00 to 22.50
Steel car axles	25.00 to 25.50
No. 1 RR wrought	14.00 to 14.50
No. 2 RR wrought	16.00 to 16.50
Steel rails under 3 ft.	23.50 to 24.00
Steel angle bars	21.25 to 21.75
Cast iron carwheels	21.00 to 21.50
No. 1 machinery cast.	19.50 to 20.00
Railroad malleable	20.00 to 21.00
Breakable cast	17.50 to 18.00
Stove plate	15.00 to 15.50
Grate bars	14.00 to 14.50
Brake shoes	13.50 to 14.00

CINCINNATI

Dealers' buying prices per gross ton at yards:	
No. 1 hvy. mltng. steel	\$18.25 to \$18.75
No. 2 hvy. mltng. steel	16.25 to 16.75
Scrap rails for mltng.	23.25 to 23.75
Loose sheet clippings	12.75 to 13.25
Hyd'lic bundled sheets	17.00 to 17.50
Cast iron borings	9.25 to 9.75
Machine shop turn.	10.00 to 10.50
No. 1 busheling	14.25 to 14.75
No. 2 busheling	7.75 to 8.25
Rails for rolling	24.50 to 25.00
No. 1 locomotive tires	20.25 to 20.75
Short rails	26.25 to 26.75
Cast iron carwheels	18.75 to 19.25
No. 1 machinery cast.	22.25 to 22.75
No. 1 railroad cast.	20.50 to 21.00
Burnt cast	12.75 to 13.25
Stove plate	12.75 to 13.25
Agricul. malleable	18.00 to 18.50
Railroad malleable	21.00 to 21.50
Mixed hvy. cast.	19.25 to 19.75

BIRMINGHAM

Per gross ton delivered to consumer:	
No. 1 hvy. melting steel	\$18.00
No. 2 hvy. melting steel	17.00
No. 1 busheling	16.00
Scrap steel rails	18.00
Steel rails under 3 ft.	20.00
Rails for rolling	19.00
Long turnings	9.50
Cast iron borings	8.50
Stove plate	13.50
Steel axles	18.00
No. 1 RR wrought	16.00
No. 1 cast	18.50
No. 2 cast	13.50
Cast iron carwheels	19.00
Steel carwheels	18.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:	
No. 1 heavy melting	\$16.25 to \$16.75
No. 2 heavy melting	15.25 to 15.75
Borings and turnings	11.25 to 11.75
Machine shop turnings	10.75 to 11.25
Long turnings	9.75 to 10.25
Short shov. turnings	11.75 to 12.25
No. 1 cast	19.50 to 20.00
Automotive cast	19.50 to 20.00
Hvy. breakable cast.	16.00 to 16.50
Stove plate	11.50 to 12.00
Hydraul. comp. sheets	17.75 to 18.25
New busheling	16.25 to 16.75
Sheet clips	13.75 to 14.25
Flashings	16.25 to 16.75
Low phos. plate	18.50 to 19.00

NEW YORK

Dealers' buying prices per gross ton on cars:	
No. 1 hvy. mltng. steel	\$15.50 to \$16.00
No. 2 hvy. mltng. steel	14.00 to 14.50
Hvy. breakable cast.	18.00 to 18.50
No. 1 machinery cast.	18.50 to 19.00
No. 2 cast	16.50 to 17.00
Stove plate	15.00 to 15.50
Steel car axles	23.00 to 23.50
Shafting	19.50 to 20.00
No. 1 RR wrought	17.50 to 18.00
No. 1 wrought long	17.00 to 17.50
Spec. iron & steel pipe	12.00 to 12.50
Rails for rolling	19.00 to 19.50
Clean steel turnings*	10.00 to 10.50
Cast borings*	11.00 to 11.50
No. 1 blast furnace	9.00 to 9.50
Cast borings (chem.)	11.00 to 11.50
Unprepared yard scrap	9.50 to 10.00
Light iron	7.00 to 7.50
Per gross ton delivered local foundries:	
No. 1 machin. cast.	\$20.50 to \$21.00
No. 2 cast	17.00 to 17.50

* \$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:	
Breakable cast	\$16.75 to \$17.00
Machine shop turn.	9.15 to 9.65
Mixed bor. & turn.	8.25 to 9.00
Bun. skeleton long	13.00 to 13.25
Shafting	19.00 to 19.50
Stove plate	13.75 to 14.00
Cast bor. chemical	10.00 to 10.50
Per gross ton delivered consumers' yards:	
Textile cast	\$22.00 to \$24.50
No. 1 machine cast.	22.00 to 24.00
Per gross ton delivered dealers' yards:	
Unprepared yard scrap	\$11.00 to \$12.00

PACIFIC COAST

Per net ton delivered to consumer:	
San Fran.	Los Ang. Seattle
No. 1 hvy. mltng. steel	Nominal
No. 2 hvy. mltng. steel	
Bundles	

CANADA

Dealers' buying prices at these yards, per gross ton:	
Toronto Montreal	
Low phos. steel	\$13.00 to \$12.50
No. 1 hvy. mltng. steel	11.25 to 10.75
No. 2 hvy. mltng. steel	10.00 to 9.75
Mixed dealers steel	8.75 to 8.25
Drop forge flashings	9.75 to 9.25
New loose clippings	8.75 to 8.25
Busheling	6.00 to 5.50
Scrap pipe	7.75 to 7.25
Steel turnings	8.00 to 7.50
Cast borings	8.00 to 7.50
Machinery cast	22.00 to 21.00
Dealers' cast	21.00 to 20.00
Stove plate	16.00 to 15.50

EXPORT

Dealers' buying prices per gross ton:	
New York, truck lots, delivered barges	
No. 1 hvy. mltng. steel	\$16.00 to \$16.50
No. 2 hvy. mltng. steel	15.00 to 15.50
No. 2 cast	17.00 to 17.50
Stove plate	15.00 to 16.00
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel	\$17.25
No. 2 hvy. mltng. steel	15.75
Rail (scrap)	\$17.25 to 17.50
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel	Nominal
No. 2 hvy. mltng. steel	Nominal

Construction Steel

...STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Structural steel lettings declined to 25,500 tons from 30,450 tons last week; new projects are higher at 33,655 tons against 26,950 tons a week ago; plate awards call for 2350 tons.

AWARDS

NORTH ATLANTIC

- 3500 Tons, Hatboro, Pa., assembly plant, Brewster Aeronautical Corp., to Belmont Iron Works, Philadelphia.
1260 Tons, Bridgeport, Conn., Bullard Co. manufacturing building, to Bethlehem Steel Co., Bethlehem, Pa.
230 Tons, Bradford County, Pa., State highway bridge, route 212, to Phoenix Bridge Co., Phoenixville, Pa.
150 Tons, Manchester, N. H., Government hangar, to Belmont Iron Works, Philadelphia, through Caye Construction Co., Inc., Brooklyn, contractor.
150 Tons, Bangor, Me., Government hangar, to Belmont Iron Works, Philadelphia, through D. A. Sullivan & Son, Inc., Northampton, Mass., contractor.
150 Tons, Indiana County, Pa., State bridge, to Fort Pitt Bridge Works Co., Pittsburgh.
125 Tons, Philadelphia, chemistry building for University of Pennsylvania, to Lehigh Structural Steel Co., Allentown, Pa.

THE SOUTH

- 1675 Tons, Norfolk, Va., Government storehouse, to Pittsburgh-Des Moines Steel Co., Pittsburgh.
700 Tons, Pensacola, Fla., three airplane hangars for Navy, to Ingalls Iron Works Co., Birmingham.
350 Tons, Birmingham, boiler supports for Combustion Engineering Co., to Virginia Bridge Co., Roanoke, Va.
100 Tons, Bogalusa, La., bleaching plant for Gaylord Container Corp., to Ingalls Iron Works Co., Birmingham.
100 Tons, Morgantown, W. Va., gas generating plant for E. I. du Pont de Nemours & Co., to R. C. Mahon Co., Detroit.

CENTRAL STATES

- 6000 Tons, Detroit, Naval gun plant, Hudson Motor Co., to Bethlehem Steel Co., Bethlehem, Pa.
4500 Tons, Kansas City, Kan., North American airplane plant, to Muskogee Iron Works, Muskogee, Okla.
1500 Tons, Madison, Ind., Army buildings, to R. C. Mahon Co., Detroit.
1300 Tons, St. Louis, buildings for continental Can Co., to Joseph T. Ryerson & Son, Inc., Chicago.
1010 Tons, Kingsbury, Ind., fuse loading lines, to Gage Structural Steel Co., Chicago.
900 Tons, Detroit, Army warehouse, to Whitehead & Kales Co., Detroit.
600 Tons, Robertson, Mo., Navy hangars, to Bethlehem Steel Co., Bethlehem, Pa.,

through Leocoutour-Parsons Construction Co., contractor.

- 500 Tons, Monsanto, Ill., chemical manufacturing plant, to Stupp Brothers Bridge & Iron Co., St. Louis.
314 Tons, Peoria, Ill., Caterpillar Tractor Co. plant addition, to Joseph T. Ryerson & Son, Inc., Chicago.
202 Tons, Fort Riley, Kan., State highway bridge, to St. Joseph Structural Steel Co., St. Joseph, Mo.
150 Tons, Kingsbury, Ind., booster loading line, to Mississippi Valley Structural Steel Co., Decatur, Ill.

WESTERN STATES

Unstated tonnage, Earp, Cal., 100-ton gantry crane for Parker power plant (Specifications 944), to Cyclops Iron Works, San Francisco.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

- 2600 Tons, Philadelphia, alterations and additions, runways and shipways, for Cramp Shipbuilding Co.
2300 Tons, Fort Edward, N. Y., bridge No. 5507 for Delaware & Hudson Railroad.
1000 Tons, Ithaca, N. Y., chemical laboratory for Cornell University; John Lowry, New York, general contractor.
900 Tons, Buffalo, magnesium fabricating plant for American Magnesium Corp.
600 Tons, Neversink, N. Y., cofferdam and diversion tunnel.
455 Tons, Niagara Falls, N. Y., plant extension for Vanadium Corp. of America.
400 Tons, Deer Park, N. Y., State Hospital boiler house.
350 Tons, Ansonia, Conn., sheet copper rolling mill building for American Brass Co.
220 Tons, Brooklyn, disposal plant platform extension.
210 Tons, Brooklyn, curbing, contract B-26, Third Avenue, for Triboro Bridge Authority.
200 Tons, Quincy, Mass., Bethlehem Steel Co. Fore River works pattern storage building.
190 Tons, Middle River, Md., State bridge, route 40.
165 Tons, Monroe County, Pa., highway bridge, C. G. Coon Construction Co., Luzerne, Pa., low bidder on general contract.
150 Tons, Boston, Northeastern University laboratory.
115 Tons, Boston, repairs to bridge No. 0.87.
100 Tons, Niagara Falls, N. Y., U. S. customs house.

THE SOUTH

- 265 Tons, Fort Knox, Ky., automotive building for War Department.
240 Tons, Falmouth, Ky., Licking River bridge for State.

CENTRAL STATES

- 9000 Tons, Melrose Park, Ill., Buick aircraft engine plant; bids taken.
7000 Tons, Dayman, Iowa, 58 storage buildings for ordnance plant.

3000 Tons, Elwood, Ill., pipe supports for ordnance works.

- 300 Tons, Stickney, Ill., sewage works structures for city of Chicago.
275 Tons, Canton, Ohio, Kroger Grocery & Baking Co. storehouse.
200 Tons, Mansfield, Ohio, warehouse addition, for Westinghouse Electric & Mfg. Co.
185 Tons, Detroit, Midland Steel Products Co. factory extension.
165 Tons, North Green Bay, Wis., addition to machine shop and engine house for Chicago & North Western Railroad Co.
160 Tons, Diamond Bluff, Wis., beam spans for Chicago, Burlington & Quincy Railroad Co.
155 Tons, Indianapolis, framing for Citizens Gas & Coke Utility.
150 Tons, Adrian, Mich., State bridge.
145 Tons, Royalton, Wis., State bridge No. 739.
140 Tons, Sparta, Wis., State bridges No. 229, 230 and 232.
135 Tons, Dearborn, Mich., State bridge.
120 Tons, Sebawaing, Mich., State bridge.
110 Tons, bear trap repair parts, Ohio River, for U. S. Engineers Office.

WESTERN STATES

- 1800 Tons, Oakland, Cal., two supply storehouses for Navy Department.
320 Tons, San Leandro, Cal., Chrysler Corp. warehouse.

FABRICATED PLATES

AWARDS

- 1700 Tons, Cairo, Ill., six oil barges for Inland Waterway Corp., to Consolidated Steel Corp., Los Angeles.
500 Tons, Pacific Coast, peg top buoys for Navy, to California Steel Products Co., San Francisco.
150 Tons, Charlottesville, Va., gas storage tank, to an unnamed bidder.

SHEET PILING

PENDING PROJECTS

- 170 Tons, Cleveland, dock for Sherwin-Williams Co.

Reinforcing Steel

Awards of 13,570 tons; 6,160 tons in new projects.

AWARDS

ATLANTIC STATES

- 1553 Tons, Groton-New London, Conn., Thames River bridge, to Truscon Steel Co., Youngstown, through A. I. Savin Construction Co., Hartford.
600 Tons, Boston, Jamaica Plain housing project, to Northern Steel Co., Boston, through John Bowen Co., Boston, contractor.
300 Tons, Brockton, Mass., city's 1941 requirements, to Northern Steel Co., Boston.

Weekly Bookings of Construction Steel

Week Ended	Feb. 11, 1941	Feb. 4, 1941	Jan. 14, 1941	Feb. 13, 1940	Year to Date	
					1941	1940
Fabricated structural steel awards	25,500	30,450	40,100	21,760	229,550	96,760
Fabricated plate awards	2,350	4,930	0	0	22,195	19,225
Steel sheet piling awards	0	295	105	100	3,250	2,350
Reinforcing bar awards	13,570	11,350	4,900	11,225	64,590	47,920
Total Letting of Construction Steel	41,420	47,025	45,105	33,085	319,585	166,255

150 Tons, Bridgeport, Conn., office building for Bridgeport Brass Co., to Truscon Steel Co., Youngstown, through Fox Steel Co.

SOUTH AND CENTRAL

- 6000 Tons, Ravenna, Ohio, 456 additional storage buildings for ammunition loading plant, to Patterson-Leitch Co., Cleveland, through Hunkin-Conkey Construction Co., Cleveland.
- 1075 Tons, Charlestown, Ind., plant for E. I. du Pont de Nemours & Co., to Truscon Steel Co., Youngstown.
- 637 Tons, South Bend, Ind., aircraft engine plant for Studebaker Corp., to Calumet Steel Co., Chicago, through W. E. O'Neil, contractor.
- 500 Tons, State of Michigan, four exchange buildings in different cities for Michigan Bell Telephone Co., to Truscon Steel Co., Youngstown, Ohio.
- 500 Tons, Columbus, Ohio, general depot warehouse, to Truscon Steel Co., Youngstown, through Fireproof Products Co.
- 330 Tons, Jackson, Miss., airport, to Truscon Steel Co., Youngstown, through Highway Materials Co.
- 304 Tons, Wilmington, N. C., new ship yard, unit No. 1, Newport News Shipbuilding & Drydock Co., to Southern Engineering Co., Charlotte, N. C.; W. P. Loftis, contractor.
- 250 Tons, Giles City, Va., project FA-FAGH-1224-E2, B2, to Virginia Steel Co., Richmond, Va.; T. A. Loving, contractor.
- 243 Tons, Racine, Wis., Johnson Wax Co., to Bethlehem Steel Co., through Johnson-Henrickson Co., contractor.
- 153 Tons, Camp Grant, Ill., miscellaneous buildings, to Calumet Steel Co., Chicago.
- 152 Tons, Sterling, Ill., Frantz Mfg. Co., to Calumet Steel Co., Chicago.
- 150 Tons, Omaha, Neb., WPA project, to Sheffield Steel Corp., Kansas City, Mo., through Pittsburgh-Des Moines Steel Co.
- 112 Tons, Greendale, Ind., R-2039, to Truscon Steel Co., Youngstown.
- 200 Tons, Canton, Ohio, Westinghouse Electric gun plant, to Jones & Laughlin Steel Corp., Pittsburgh; Rust Engineering Co., contractor.

WESTERN STATES

240 Tons, Helena, Mont., armory building, to Truscon Steel Co., Youngstown.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 660 Tons, Providence, R. I., Chad Brown housing; previously reported 200 tons.
- 500 Tons, New Haven, Conn., housing project.
- 100 Tons, Mount Lebanon, Pa., requirements of Camp Bell on Seneca Road.

CENTRAL STATES

- 400 Tons, Kohler, Wis., Kohler Co. plant addition.
- 280 Tons, Fort Wayne, Ind., Studebaker Corp. engine parts plant.
- 270 Tons, Cincinnati, city purchasing department; bids Feb. 18.

WESTERN STATES

- 2500 Tons, San Francisco, Union Square garage.
- 137 Tons, Tucumcari, N. M., Bureau of Reclamation (Invitation 32,988-A); bids taken.
- 120 Tons, Berkeley, Cal., University of California medical research building; bids in.

CANAL ZONE

- 721 Tons, Panama Canal, schedule No. 4794; bids Feb. 14.
- 441 Tons, Panama Canal, schedule No. 4815; bids Feb. 19.

PUERTO RICO

- 230 Tons, San Juan, procurement invitation 38261; bids taken.

Pipe Lines

Gulf Oil Corp., Gulf Building, Houston, Tex., plans new 6-in. welded-joint, cast iron pressure pipe line from Opelika oil field, Henderson County, Tex., to main pumping station near Big Sandy, Tex., close to 40 miles, for crude oil transmission. It will have a capacity of approximately 6000-bbl. per day.

Southern Natural Gas Co., Watts Building, Birmingham, has authorized immediate construction of new 14-in. welded steel pipe line from Logansport, De Soto County, La., gas field, near Louisiana-Texas State line, to connection with pipe line system near Monroe, La., about 135 miles, for natural gas transmission. Cost about \$2,200,000 with booster

stations and other operating facilities. Award for about 16,000 tons of pipe has been divided between National Tube Co., and Republic Steel Corp. Ford, Bacon & Davis, Inc., 39 Broadway, New York, is consulting engineer and will supervise installation.

Morgan City, La., is considering bond issue of \$220,000 for installation of pressure pipe line system for municipal natural gas distribution, including welded steel pipe line for main supply from gas field at Bateman Lake to point on Atchafalaya River, where connection will be made with new control station for local distribution. Part of line, from Bateman Lake to Berwick, will be submarine installation. Steel supply line is estimated to cost about \$53,000 of total fund noted. T. Baker Smith, Houma, La., is consulting engineer.

Connecticut Light & Power Co., 36 Pearl Street, Hartford, Conn., has authorized appropriation of \$75,000 in 1941 budget for extensions and replacements in gas pipe lines in different parts of system.

St. Petersburg, Fla., plans extensions in pipe lines for municipal gas distribution. Appropriation is being arranged for 1941 work. G. V. Leland is city manager.

Ministry of National Economy, Government of Mexico, Mexico, D. F., plans utilization of natural gas resources in different oil field districts, including gathering pipe line systems and main welded steel pipe lines for transmission to various centers for industrial and commercial service. Project will include compressor stations, control and meter houses, and other operating facilities. It is proposed to purchase material in United States. Initial plans as arranged by Ministry have been approved by President Manuel Avila Camacho, and fund for work will be arranged soon.

Cast Iron Pipe

Village Council, Fox Point, near Milwaukee, Frederick D. Ivins, village clerk, asks bids until Feb. 24 for 2100 ft. of 8-in. pipe and 1700 ft. of 6-in., all 12-ft. lengths, for water system; also for about one and one-half tons of special castings (Items 1, 2 and 3); 15 6-in. gate valves, 15 valve boxes and nine 6-in. hydrants (Items 4, 5 and 6). Charles S. Whitney, 724 East Mason Street, Milwaukee, is consulting engineer.

Water Department, Oklahoma City, Okla., plans pipe line extensions in system, including main supply lines in different parts of city; also elevated steel storage tank on steel tower, and pumping station with initial capacity of 45,000,000 gal. per day. Work will be carried out in connection with new earthen dam and diversion canal for supply source, with filtration plant to handle 30,000,000 gal. per day. Bond issue of \$6,911,000 has been authorized for entire project. M. B. Cunningham is water superintendent and engineer.

Bethany, Mo., is considering new 8-in. line from standpipe to business district, for main water supply in latter area.

Water Board, San Antonio, Tex., plans about 8000 ft. of 6 and 8-in. pipe for water system in Olmos district.

Kenosha, Wis., will take bids soon for about 1000 ft. of 12-in. pipe, 1500 ft. of 8-in., and 6000 ft. of 6-in., for extensions in water system. H. C. Laughlin is city manager.

Bremont, Tex., plans pipe line extensions and replacements for water system and other waterworks installation. Cost about \$51,800. Garrett Engineering Co., 918 Richmond Street, Houston, Tex., is consulting engineer.

North Madison, Ind., plans pipe lines for water system and other waterworks installation. Cost about \$40,000. H. B. Steeg & Associates, Inc., East Market Street Building, Indianapolis, is consulting engineer.

Mount Zion, Ill., plans water pipe lines and other waterworks installation. Cost about \$46,000. Financing is being arranged through Federal aid. Warren & Van Pragg, Decatur, Ill., are consulting engineers.

King County, Wash., Water District No. 64, will take bids Feb. 17 on 8530 ft. of 2-in., 10,860 ft. of 6-in., and 780 ft. of 8-in. pipe and appurtenant supplies. Parker & Hill, 2021 Smith Tower, Seattle, are engineers.

Trade Notes

Hendrick Mfg. Co. has opened a Baltimore sales office at Baltimore Street and Guilford Avenue. The new sales office will be under the supervision of B. F. Gardner.

Jessop Steel Co., Washington, Pa., has established a new branch office and warehouse at Woodbridge and Walker Streets, Detroit, Mich. David Hanna, district manager, is in charge. Jessop Steel Co. has also recently established a new warehouse at 1433 Hamilton Avenue, Cleveland. F. P. McGahan is district manager.

The Keystone Machinery Co. here has purchased the entire equipment of the A. D. Miller Sons Oil Refinery, Pittsburgh.

Purchase of a structural steel building, 284 x 116 ft., by the American Rolling Mill Company at Middletown, Ohio, from the Cincinnati Gas & Electric Co. has been announced. This building is to be dismantled and moved to Middletown where it will be erected at the east works of the Middletown Unit.

Denison Engineering Co. has leased an entire building at 548-558 W. Broad Street, Columbus, Ohio, known as the Esswein Plumbing Co. building, containing approximately 12,000 sq. ft., which will house plant No. 3, according to W. S. Denison, Jr., president of the company. Offices remain at plant No. 1, 119 W. Chestnut St. Frank C. Norris is general manager.

Purchase of patents covering design and methods of producing pressed steel (cup type) blower wheels has been announced by the Torrington Mfg. Co., Torrington, Conn. The patents were acquired from the American Blower Corp., of Detroit, Mich.

Cooper Alloy Foundry Co., manufacturers of alloy steel castings, valves and fittings, has acquired some additional 20,000 sq. ft. of buildings on 5½ acres of land in Hillside, N. J. The buildings and plant were purchased from the Breen Iron Works.

Lukens Steel Co., Coatesville, Pa., and its subsidiaries, Lukenweld, Inc., and the By-Products Steel Corp., have moved their New York sales offices from the Chrysler Building to rooms 1973-5 at 50 Church Street. J. J. Reynolds is district sales manager.

Swartz Tool Products Co. has changed its address to 13300 Foley Avenue, Detroit, where the company is building a new plant occupying 11,000 sq. ft.

Wolverine Nut Co. announces removal of its offices to new quarters at 6556 E. McNichols Road, Detroit, effective Feb. 3.

Kennametal Tools & Mfg. Co., Ltd., 24 Dunbar Street, Hamilton, Ont., has recently obtained the franchise for distribution of Kennametal tips and finished tools.

H. O. Bates, 251-257 North Broad Street, Elizabeth, N. J., manufacturers of marking devices and consultants on marking problems, has been incorporated as The Acromark Corp.

Columbia Steel & Shafter Co., Edgar T. Ward's Sons Co. and Summerill Tubing Co., all affiliated interests, announce the opening of a district sales office in the Third National Building at Dayton, Ohio. Representing the interests of the three companies in the Dayton office will be C. W. Ritz and J. E. Merchant.

Reliance Electric & Engineering Co., Cleveland, is opening a sales office in Minneapolis, with Elwood H. Koontz as district manager.

Acme Equipment Co., Inc., Detroit, has moved into new and larger quarters at 14057 Schaefer Highway, that city.

Pal Blade Co. of Montreal, Plattsburg, N. Y., and Buenos Aires, Arg., has acquired the cutlery division of the Remington Arms Co., Inc., of Bridgeport, Conn.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point ↓ Product													DELIVERED TO		
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Phila- delphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes ²	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE															
Standard cokes (Per 100-lb. base box)	\$5.00	\$5.00	\$5.00						\$5.10						
BLACK PLATE															
29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (*)			
TERNES, M'FG.															
Special coated (Per base box)	\$4.30		\$4.30						\$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail) ⁷	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢							2.70¢		
PLATES										(Coatesville and Claymont = 2.10¢)					
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢				(Coatesville = 3.50¢)									
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢				(Worcester = 3.00¢)							
0.51 to 0.75 Carbon	4.30¢			4.30¢				(Worcester = 4.50¢)							
0.76 to 1.00 Carbon	6.15¢			6.15¢				(Worcester = 6.35¢)							
1.01 to 1.25 Carbon	8.35¢			8.35¢				(Worcester = 8.55¢)							
WIRE⁹															
Bright	2.60¢	2.60¢		2.60¢	2.60¢			(Worcester = 2.70¢)							
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢			(Worcester = 2.70¢)							
Spring	3.20¢	3.20¢		3.20¢				(Worcester = 3.30¢)							
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS															
Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

¹ Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.25 per cent and less. ⁵ Applies to 29 gage within certain width and length limitations. ⁶ For merchant trade. ⁷ Straight lengths as quoted by distributors. ⁸ Also shafting. For quantities of 20,000 to 39,999 lb. ⁹ Carload lots to manufacturing trade. ¹⁰ Boxed.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Re-rolling only). Prices delivered Detroit are \$2 higher f.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton

Re-rolling \$34.00
Forging quality 40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

Per Gross Ton

3 in. to 12 in. \$52.00
12 in. to 18 in. 54.00
18 in. and over 56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open hearth or bessemer \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared. 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Lb.

Pittsburgh, Chicago, Cleveland. 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.50c.
Galveston 2.25c.

9/32 in. to 4/64 in., \$3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

20x14 in. 20x28 in.

8-lb. coating I.C.	\$6.00	\$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

Base per Keg

Standard wire nails \$2.55

Coated nails 2.55

Cut nails, carloads 3.85

Base per 100 Lb.

Annealed fence wire \$3.05

Base Column

Woven wire fence* 67

Fence posts (carloads) 69

Single loop bale ties 56

Galvanized barbed wire† 70

Twisted barbless wire 70

*15½ gage and heavier. †On \$0-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:

½ in. and smaller by 6 in. and shorter 68

9/16 and 5/8 in. by 6 in. and shorter 66

¾ to 1 in. by 6 in. and shorter 64

1½ in. and larger, all lengths 62

All diameters over 6 in. long 62

Lag, all sizes 65

Plow bolts 68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:
½ in. and smaller 66
9/16 to 1 in. inclusive 63
1½ to 1½ in. inclusive 61
1½ in. and larger 60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for car-load shipments.

Semi-fin. hexagon nuts U.S.S. S.A.E.

½ in. and smaller 66 70

9/16 to 1 in. 63 65

1½ in. through 1½ in. 61 62

1½ in. and larger 60

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose 73 and 100

Stove bolts in packages, with nuts attached 73

Stove bolts in bulk 81

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

Base per 100 l.b.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham \$3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 65 and 10

Cap and Set Screws

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller 50

Milled headless set screws, cut thread ¼ in. and larger 64

3/16 in. and smaller 73

Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller 68

Upset set screws, cup and oval points 71

Milled studs 52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Feb. 5	Feb. 6	Feb. 7	Feb. 8	Feb. 10	Feb. 11
Copper, Electrolytic ¹	12.00	12.00	12.00	12.00	12.00	12.00
Copper, Lake 12.00	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York..	50.35	50.35	50.25	....	50.25	50.25
Zinc, East St. Louis....	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis ²	5.35	5.35	5.35	5.35	5.50	5.50

¹ Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

Tin	New York	Cleveland
Straits pig 51.25	53.75	
Copper		
Electro 12.75	14.00	
Castings 12.50	13.50	
H. R. Sheets* 20.12	20.12	
Seamless tubes* 20.62	20.62	
Brass		
Yellow sheets* 18.65	18.65	
Yellow, rods* 13.67	13.67	
Seamless tubes* 21.40	21.40	
Zinc		
Slabs Nom'al	Nom'al	
Sheet, No. 9 casks..	13.50	Nom'al
Lead		
American pig 6.65	6.15	
Bar 8.60	8.65	
Cut sheets 8.90	8.90	
Antimony		
Asiatic 16.00	17.00	
Aluminum		
Virgin, 99% 20.00	21.00	
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½ 30.825	32.25	
Babbitt		
Anti-friction grade ..	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible 10.50	11.125	
Hvy. and wire 9.50	9.90	
Light and bottoms..	8.50	9.00
Brass		
Heavy 6.50	7.00	
Light 5.50	6.25	
No. 1 yel. turn.....	6.00	6.50
No. 1 red or compo. turnings	9.25	10.25
Hvy. Mach. compo..	9.50	9.875
Lead		
Heavy 4.50	5.00	
Aluminum		
Cast Nom'l	Nom'l	
Sheet Nom'l	Nom'l	
Zinc Nom'l	Nom'l	

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 17-17.50c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICK-SILVER, \$169-\$170 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 3¾%; on brass sheets and rods, 40; on brass tubes, 3¾%, and copper tubes, 40.

PRICES

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....\$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade..... 2.70c.

Delivered, Detroit..... 2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	\$0.35

2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20

6100 Cr-V spring steel.....	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.
Open hearth grade3.50c.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

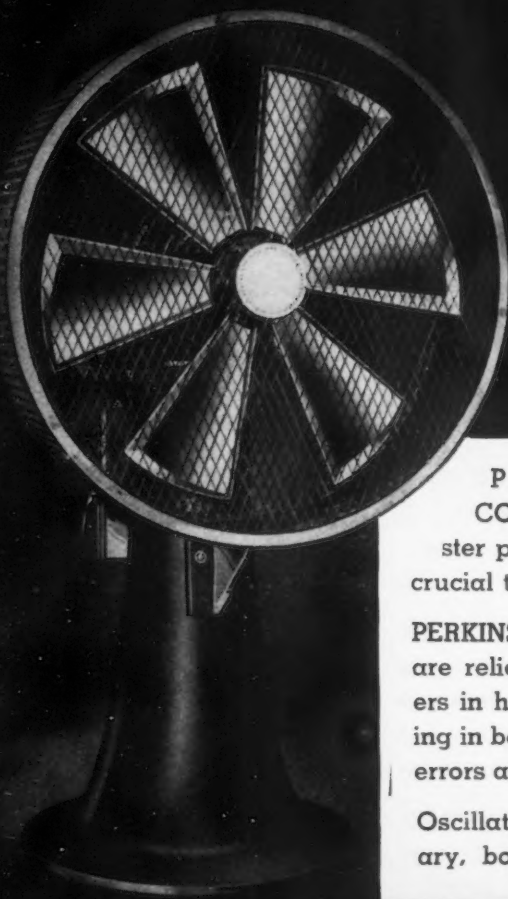
Per Net Ton

6-in. and larger, del'd Chicago.	\$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham.	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago.

PERKINS MAN COOLERS

TRADE MARK REGISTERED UNITED STATES PATENT OFFICE



PERKINS MAN COOLERS will bolster production in these crucial times.

PERKINS MAN COOLERS are relieving many workers in hot places — resulting in better quality, fewer errors and greater volume.

Oscillating and Stationary, both types portable.

B. F. PERKINS & SON, Inc.
ENGINEERS AND MANUFACTURERS
HOLYOKE, MASS.

PRICES

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

		Seamless	Lap Weld,
		Drawn	Hot Rolled
		Cold	Hot
		Hot	Hot
1 in. o.d. 13 B.W.G.	\$9.01	\$7.82	....
1 1/4 in. o.d. 13 B.W.G.	10.67	9.26	....
1 1/2 in. o.d. 13 B.W.G.	11.70	10.23	\$9.72
1 3/4 in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2 1/4 in. o.d. 13 B.W.G.	16.76	14.54	13.79
2 1/2 in. o.d. 12 B.W.G.	18.45	16.01	15.16
2 3/4 in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 1/2 in. o.d. 12 B.W.G.	22.48	19.50	18.35
4 in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 1/2 in. o.d. 10 B.W.G.	35.20	30.54	28.66
5 in. o.d. 9 B.W.G.	43.04	37.35	35.22
6 in. o.d. 7 B.W.G.	54.01	46.87	44.25
8 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = \$200 Per Net Ton

Butt Weld

Steel	Black	Galv.
1/8 in.	56	36
1/4 to 3/8 in.	59	43 1/2
1/2 in.	63 1/2	54
3/4 in.	66 1/2	58
1 to 3 in.	68 1/2	60 1/2

Wrought Iron	Black	Galv.
1/4 and 3/8 in.	+9	+10
1/2 in.	24	6 1/2
3/4 in.	30	13
1 and 1 1/4 in.	34	19
1 1/2 in.	38	21 1/2
2 in.	37 1/2	21

Lap Weld

Steel	Black	Galv.
2 in.	61	52 1/2
2 1/2 and 3 in.	64	55 1/2
3 1/2 to 6 in.	66	57 1/4
7 and 8 in.	65	55 1/2
9 and 10 in.	64 1/2	55
11 and 12 in.	63 1/2	54

Wrought Iron	Black	Galv.
2 in.	30 1/2	15
2 1/2 to 3 1/2 in.	31 1/2	17 1/2
4 in.	33 1/2	21
4 1/2 to 8 in.	32 1/2	20
9 to 12 in.	28 1/2	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
1/8 in.	54 1/2	41 1/2
1/4 to 3/8 in.	56 1/2	45 1/2
1/2 in.	61 1/2	53 1/2
3/4 in.	65 1/2	57 1/2
1 to 3 in.	67	60

Wrought Iron

1/4 and 3/8 in.	+10	+43
1/2 in.	25	9
3/4 in.	31	15
1 to 2 in.	38	22 1/2

Lap weld, extra strong, plain ends

Steel	Black	Galv.
2 in.	59	51 1/2
2 1/2 and 3 in.	63	55 1/2
3 1/2 to 6 in.	66 1/2	59

	Black	Galv.
7 and 8 in.	65 1/2	56
9 and 10 in.	64 1/2	55
11 and 12 in.	63 1/2	54

Wrought Iron

2 in.	33 1/2	18 1/2
2 1/2 to 4 in.	39	25 1/2
4 1/2 to 6 in.	37 1/2	24
7 and 8 in.	38 1/2	24 1/2
9 to 12 in.	32	20 1/2

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

ANNOUNCING

Causplit Cement

RESISTANT TO STRONG

CAUSPLIT CEMENT, which can readily handle a wide range of strong acids, alkalies and solvents at temperatures up to 350°F., has properties never before available in such products. Causplit's chemical resistance is unique; and it is quick-setting, tough and durable, easy to handle, resistant to abrasion and to rapid changes in temperature.

Extensive tests have proved that Causplit is admirably suited to the corrosion-proof construction of industrial equipment lining. In fact, Causplit Cement represents a considerable improvement over Penchlor Acid-Proof Cement and Asplit Cement, which have been successfully used in many industries for more than 7 years.

CHEMICAL PLANTS: Causplit Cement makes an ideal mortar because it is so versatile — resists muriatic and other strong acids, potassium carbonate and other salts, ammonia and various strong alkalies, phenol, toluol, alcohols, acetone and numerous other chemicals. You can use Causplit where conditions are alternately alkaline and acid—where other cements will not endure.

PULP AND PAPER MILLS: For pulp digesters, bleaching system equipment, acid towers, recovery systems, etc., Causplit Cement is economical and durable. It is unaffected by 50% caustic soda, hypochlorites and chlorine, sulfurous acid, sodium sulfite, sodium sulfide and other chemicals used in the industry. Causplit withstands abrasion, repeated washings and sudden temperature changes.

STEEL MILLS: Causplit Cement is adapted to pickling, neutralizing and degreasing tanks and similar equipment, because it's not harmed by concentrated sulfuric acid, hydrofluoric acid or hydrochloric acid, nor by strong alkalies and solvents. Causplit maintains tight joints and preserves bricks even under severe service conditions, lasting far longer than other types of cement construction.

Write or wire us for **FREE TEST KIT**, including samples, booklet of information and test data showing Causplit's resistance to various acids, alkalies and solvents. Pennsylvania Salt Manufacturing Co., Widener Bldg., Philadelphia, Pa.—New York • Chicago • St. Louis • Pittsburgh • Tacoma • Wyandotte.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

PRICES

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, bessemer, 51.50%...	\$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%.....	4.60
Mesaba, non-bessemer, 51.50%..	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore.
Exclusive of Duty

Per Unit

African, Indian, 44 to 48% Mn....	57c.
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African, Indian, 49 to 51% Mn....	60c.
Brazilian, 46 to 48% Mn.....	54c.
Cuban, del'd, duty free, 51% Mn.67 1/2c.	

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered....	\$23 to \$24
Tungsten, domestic, scheelite, delivered.....	\$23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade).....	Nom.
Rhodesian, 45%	\$25.00
Rhodesian, 48%	\$28.00 to \$30.00

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton.....	\$40.00
Angle bars, 100 lb.....	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	\$40.00
Light rails (from rail steel), gross ton	39.00

Base per Lb.

Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)....	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR Per Net Ton

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail....	\$20.00 to \$21.00
Domestic, f.o.b. Ohio River land- ing barges	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines....	20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2 1/2% silicon, f.o.b. Illi- nois and Kentucky mines....	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick Per 1000 f.o.b. Works

Super-duty brick at St. Louis...	\$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey.....	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Mis- souri and Illinois.....	42.75
Second quality, New Jersey....	49.00
No. 1 Ohio.....	39.90
Ground fire clay, per ton	7.10

Silica Brick

Pennsylvania	\$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick

Net per Ton

Standard f.o.b. Baltimore, Plym- outh Meeting and Chester	\$50.00
Chemically bonded f.o.b. Balti- more, Plymouth Meeting and Chester, Pa.	

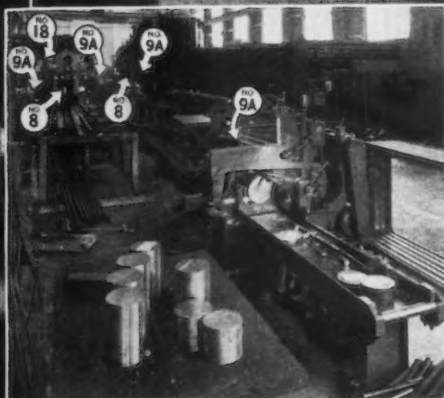
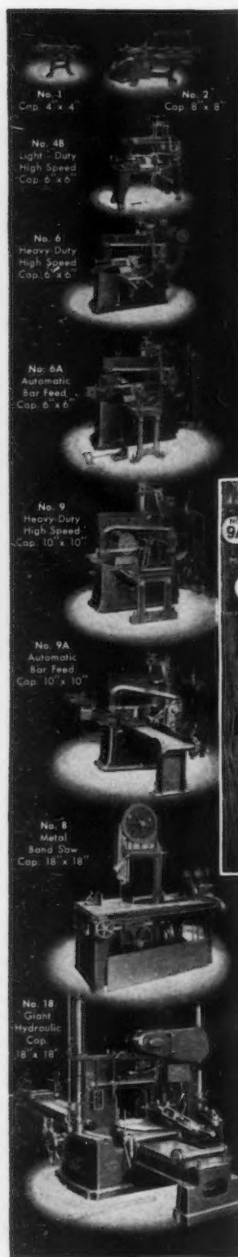
Magnesite Brick

Standard f.o.b. Baltimore and Chester	\$72.00
Chemically bonded, f.o.b. Balti- more	61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	\$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.



MARVEL SAWS help speed up National Defense at the Rock Island Arsenal

The bridge crane rolls down the bay, picks up a nest of long bars from the stock rack and lays them on the stock track of a MARVEL NO. 9A. With the re-engagement of the automatic bar push-up, production is resumed, and accurately cut-off lengths again begin piling up at surprising speed. Meanwhile, another 9A is automatically cutting-off great slices from the 10-inch diameter bar. Down the bay, still other No. 9As are rapidly reducing long bars to accurately measured pieces. A second glance at the giant MARVEL No. 18 Hydraulic, shows it to be already deep in the large billet which was just moved into position, while nearby, two MARVEL No. 8 Metal-Cutting Band Saws are busy making a great variety of miscellaneous cuts in stock of all sizes and shapes.

There is a different atmosphere in this MARVEL equipped cutting-off department... none of the endless "plugging along" that one used to associate with hack sawing. Instead, smooth running high-speed production... real output with modern high speed, all ball-bearing equipment. Because no other accurate cutting-off method can equal MARVEL SAWS in speed, dependability, or low cost per piece, they are being widely used in speeding-up the great National Defense Program.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office: 199 Lafayette Street, New York



PRICES

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....\$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....\$36.00

Domestic, 26 to 28%.....49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk).....\$74.50*

50% (ton lots, packed).....87.00*

75% (carload lots, bulk).....135.00*

75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....\$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% \$1 per ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%.....\$28.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon.....11.00c.

2% carbon17.50c.

1% carbon18.50c.

0.10% carbon20.50c.

0.06% carbon21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon\$113.00*

2.50% carbon118.00*

2% carbon123.00*

1% carbon133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload.....\$2.00

Ferrotungsten, 100 lb. and less 2.25

Ferrovandium, contract, per lb. contained V, del'd \$2.70 to \$2.90†

Ferrocolumbium, per lb. contained columbium f.o.b. Niagara Falls, N. Y., ton lots\$2.25†

Ferrocobaltitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton.....\$142.50

Ferrocobaltitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract per net ton.....\$157.50

*Spot prices are \$5 per ton higher.

†Spot prices are 10c. per lb. of contained element higher.

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton58.50

Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville75.00

Ferromolybdenum, per lb. Mo, f.o.b. furnace95c.

Calcium molybdate, per lb. Mo, f.o.b. furnace80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

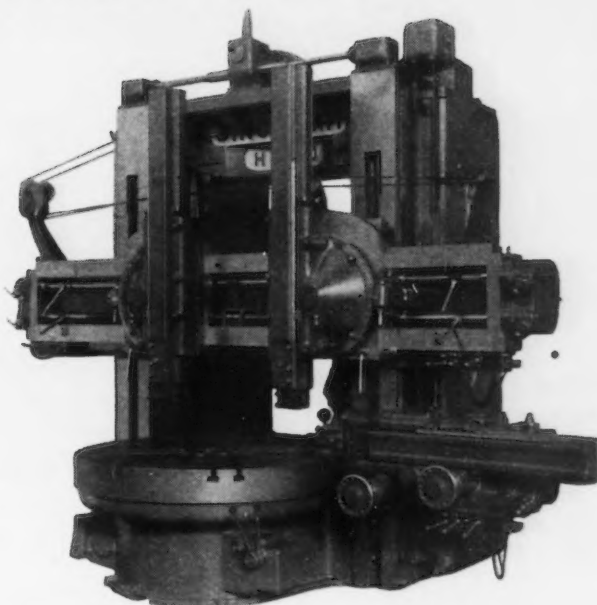
FUEL OIL

No. 3, f.o.b. Bayonne, N. J.....4.30c.
No. 6, f.o.b. Bayonne, N. J.....2.98c.
No. 5 Bur. Stds., del'd Chicago. 3.25c.
No. 6 Bur. Stds., del'd Chicago. 2.75c.
No. 3 distillate, del'd Cleveland. 5.50c.
No. 4 industrial, del'd Cleveland. 5.25c.
No. 5 industrial, del'd Cleveland. 5.00c.
No. 6 industrial, del'd Cleveland. 4.75c.

Cincinnati

SPIRAL BEVEL GEARED

HYPRO VERTICAL BORING MILLS



Engineered to combine speed, flexibility and ease of control with power, rigidity and accuracy to meet the requirements of today.

Designed for:

1. Centralized Pendant Station Control which provides operation of the entire machine from the operator's position.
2. Individual feed and rapid traverse boxes with independent Rapid Traverse Motors for each head, making it possible to control each head independent of the other.
3. Automatic lubrication provided to all feed boxes, table drive, heads and saddles requiring no attention on the part of the operator.

In these competitive times, you need this kind of equipment. Full particulars sent upon written request.

Sizes—54", 64", 72", 84", 100", 120", 144".

PLANERS • PLANER MILLERS • BORING MILLS
THE CINCINNATI PLANER CO.
CINCINNATI, OHIO

PRICES

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt	\$5.25 to \$5.75
Foundry, f.o.b. Connellsville, prompt	\$5.50 to \$6.00
F'dry, by-product, Chicago	10.50
F'dry, by-product, New England	13.00
Foundry, by-product, Newark or Jersey City	\$11.30 to \$11.90
F'dry, by-product, Philadelphia	11.13
F'dry, by-product, Cleveland	11.55
F'dry, by-product, Cincinnati	11.00
Foundry, Birmingham	7.50
F'dry, by-product, St. Louis	\$10.75 to \$11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	\$14.75

BRITISH

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export	£29 16s. 3d.
Tin plate, per base box	32s. to 33s.
Steel bars, open hearth	£16 10s.
Beams, open hearth	£15 8s.
Channels, open hearth	£15 8s.
Angles, open hearth	£15 8s.

Black sheets, No. 24, gage
£22 5s. max.* £22 5s. min.**

Galvanized sheets, No. 24 gage
£25 12s. 6d. max.*; £25 12s. 6d. min.**

*Empire markets only.

**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	\$25.50	\$25.00	\$26.50	\$26.00	.....
Brooklyn	27.50	.....	.....	28.00	.....
Jersey City	26.53	26.03	27.53	27.03	.....
Philadelphia	25.84	25.34	26.84	26.34	.....
Bethlehem, Pa.	\$25.00	\$24.50	\$26.00	\$25.50	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....
Steelton, Pa.	.....	24.50	.....	.....	28.50
Birdsboro, Pa.	25.00	24.50	26.00	25.50	28.50
Sparrows Point, Md.	25.00	24.50	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....
Sharpsville, Pa.††	24.00	23.50	24.50	24.00	.....
Buffalo	24.00	23.00	25.00	24.50	28.50
Cincinnati	24.44	24.61	.....	25.11	.....
Canton, Ohio	25.39	24.89	25.89	25.39	.....
Mansfield, Ohio	25.94	25.44	26.44	25.94	.....
St. Louis	24.50	24.02	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	.....
Granite City, Ill.	24.00	23.50	24.50	24.00	.....
Cleveland	24.00	23.50	24.50	24.00	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....
Toledo	24.00	23.50	24.50	24.00	.....
Youngstown††	24.00	23.50	24.50	24.00	.....
Detroit	24.00	23.50	24.50	24.00	.....
St. Paul	26.63	.....	27.13	26.63	.....
Duluth	24.50	.....	25.00	24.50	.....
Birmingham	19.38*	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle	27.50	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce.....\$23.50

CHARCOAL

Lake Superior fce.....\$27.00
Delivered Chicago 30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

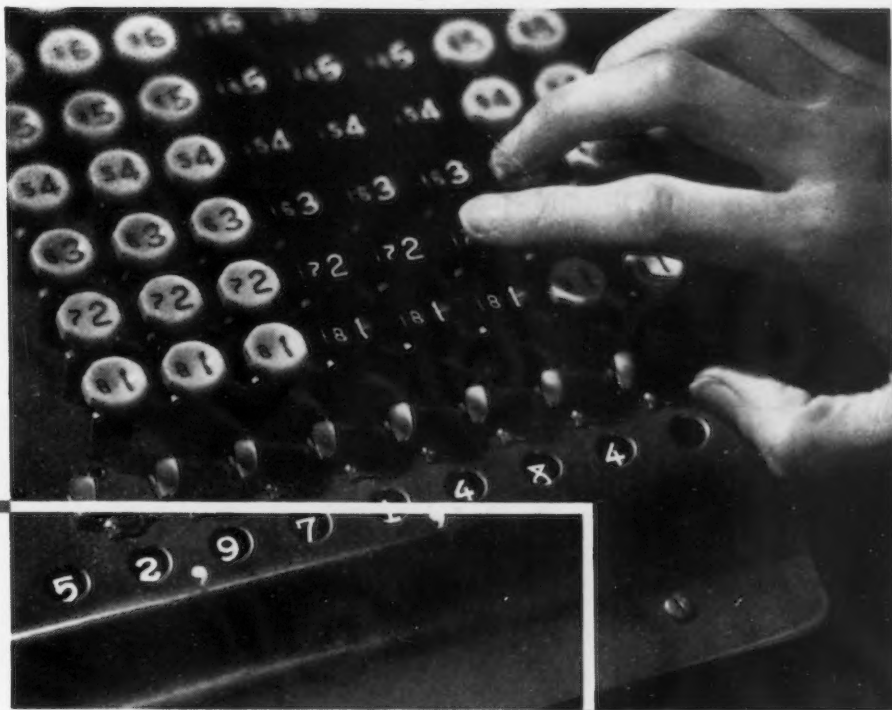
*Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

	Pitts- burgh	Chicago	Cleve- land	Phila- delphia	New York	Detroit	Buffalo	Boston	Birm- ingham	St. Louis	St. Paul	Mil- waukee	Los Angeles
Sheets, hot rolled	\$3.35	\$3.05	\$3.35	\$3.55	\$3.58	\$3.23	\$3.25	\$3.51	\$3.45	\$3.39	\$3.30	\$3.48	\$4.30
Sheets, cold rolled	.....	4.10	4.05	4.05	4.40	4.30	4.30	4.58	.....	4.12	4.35	4.43	6.50
Sheets, galvanized	4.75	4.60	4.62	4.90	5.00	4.64	4.75	5.11	4.75	4.87	4.75	4.98	5.25
Strip, hot rolled	3.60	3.40	3.50	3.95	3.96	3.48*	3.82	3.86	3.70	3.74	3.65	3.73	.....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.20	3.22	3.26	.....	3.61	3.83	3.54	.....
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.69	3.80	3.68	4.00
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.15
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.55	7.31	7.60	7.42	7.35	7.50	.....	7.72	7.45	7.33	9.40
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	.....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.40	8.56	8.84	8.45	8.40	8.63	.....	8.77	8.84	8.38	10.65
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	.....	7.12	7.44	6.98	9.80

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier. \$3.25.



How

TO INCREASE YOUR PROFITS THROUGH PROPER SEATING!

IT IS a well known fact that the efficiency and production of office workers *increase* as a result of improved seating and better posture during working hours.

Chairs of the proper type, designed specifically for the work at hand, actually help make money by reducing fatigue and fostering sustained mental alertness. This assures a greater volume of better work in a given time.

Artility offers three types of correctly designed office chairs, Posture — Adjustable — Conventional. Reasonably priced, these comfortable chairs are

beautifully styled to harmonize with the modern office. Made of steel for long life and good appearance. Upholstered in leather or fabric for utmost comfort.

Artility metal chairs are contributing to the popularity of steel office furnishings.



See how little it actually costs to promote greater office efficiency (and increased profits) through better seating.

Artility Chairs are for sale by leading office equipment dealers everywhere. Write for illustrated CATALOG of *all three types* today.



ADJUSTABLE CHAIR



POSTURE CHAIR



CONVENTIONAL TYPE

ARTILITY METAL PRODUCTS, INC.

126 SECOND STREET, ELKHART, INDIANA

ARTILITY METAL CHAIRS

Sales Possibilities

... CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **United Aircraft Corp.**, East Hartford, Conn., has let general contract to Edwin Moss & Son, 555 Grant Street, Bridgeport, Conn., for one-story addition to plant of Vought-Sikorsky Division, Stratford, Conn., 400 x 450 ft.; also for new boiler house, 38 x 50 ft. Cost over \$500,000 with equipment.

Atlantic Wire Co., Branford, Conn., steel wire products, has asked bids on general contract for one-story addition, 40 x 112 ft., for expansion in annealing division. Cost over \$65,000 with equipment. Leo F. Caproni, 1221 Chapel Street, New Haven, Conn., is architect and engineer.

Pal Blade Co., 595 Madison Avenue, New York, razor blades, has leased about 100,000 sq. ft. in former mill of Farr Alpaca Co., Holyoke, Mass., for new plant. Company has acquired cutlery division of Remington Arms Co., Bridgeport, Conn., including equipment, and will remove to Holyoke. Vacated space at Remington plant will be used for additional machinery for production of cartridges.

Bethlehem Steel Co., Shipbuilding Division, Quincy, Mass., has let general contract to B. R. Switzer Co., 39 Warren Street, Charlestown, Mass., for one-story shop, 46 x 182 ft., for sheet metal-working. Cost over \$80,000 with equipment. Work also is under way on one-story welding works, 100 x 1000 ft., for assembling service. Cost over \$350,000 with equipment.

Hartford Electric Light Co., Hartford, Conn., has authorized expansion in local South Meadow steam-electric generating plant, including new 45,000-kw. turbine-generator unit, high-pressure boilers and auxiliary equipment. Cost close to \$4,000,000 with extensions in switchyard, transmission lines and other facilities.

Stevens Paper Mills, Inc., Windsor, Conn., special tissue and insulating papers, etc., has let general contract to R. F. Jones Co., 15 Lewis Street, Hartford, Conn., for two-story and basement addition to mill at Westfield, Mass., 50 x 108 ft. Cost over \$70,000 with equipment.

American Can Co., 230 Park Avenue, New York, has let general contract to C. M. Norris, 100 North La Salle Street, Chicago, for one-story additions to branch plant at Houston, Tex. Cost close to \$500,000 with equipment. David M. Duller, Second National Bank Building, Houston, Tex., is engineer.

Navy Department, Washington, has acquired about 30 city blocks in vicinity of Brooklyn Navy Yard, including Wallabout Market, for expansion in yard. Two super drydocks will be built for constructing battleships up to 60,000 tons rating, with shops and other structures. Entire project will cost about \$15,000,000. Rear Admiral Clarke H. Woodward is commandant of Third Naval District and Brooklyn yard, in charge.

Ingersoll-Rand Co., 11 Broadway, New York, air compressors, engines and other heavy machinery, has approved plans for one-story addition, 120 x 200 ft., to branch plant at Painted Post, N. Y. Cost over \$85,000 with equipment.

RCA Mfg. Co., 411 Fifth Avenue, New York, has let general contract to H. K. Ferguson Co., Hanna Building, Cleveland, for one-story addition to branch plant at 501 North LaSalle Street, Indianapolis. Cost close to \$500,000 with equipment.

Niacet Chemicals Corp., Niagara Falls, N. Y., acetic acid, acetylene products, etc., has asked bids on general contract for three-story and basement addition, about 55 x 70 ft. Cost over \$60,000 with equipment.

Hewitt Rubber Corp., 240 Kensington Avenue, Buffalo, mechanical rubber goods, has

let general contract to John W. Cowper Co., Inc., Sidway Building, for one-story addition, about 100 x 100 ft. Cost close to \$75,000 with equipment. H. E. Plumer & Associates, 775 Main Street, are consulting engineers.

Tonawanda Island Shipyards, Inc., Tonawanda, N. Y., recently organized, has acquired boat-building and repair plant of Hill-Manning Boat Corp., Tonawanda Island, in Niagara River, for construction of vessels of certain types for Government. Carlton J. Rich, Buffalo, is president; Robert J. Woods, engineer, Bell Aircraft Corp., Buffalo, is vice-president.

Edgcomb Steel Co., D Street and Erie Avenue Philadelphia, has let general contract to D. O. Evans, 1445 North Broad Street, Hillside, N. J., for new one-story storage and distributing plant, 100 x 440 ft., with two-story section, 40 x 100 ft., for office, at Hillside. Cost about \$100,000 with equipment.

Eisler Engineering Co., 730 South Sixteenth Street, Newark, N. J., machinery for production of radio tubes, welding apparatus, pressure blowers, etc., plans one-story and basement addition, about 45 x 90 ft., for expansion in welding machine department. Cost close to \$50,000 with equipment. Wolf & Glucksmann, 850 Broad Street, are architects.

International Arms & Fuze Co., Parsippany, Boonton, N. J., has acquired former local plant of Ollesheimer & Durochie Co., lamp manufacturer, about 38,000 sq. ft. of floor space, for manufacture of ordnance for Government.

Conmar Products Corp., 717 Avenue A, Bayonne, N. J., metal zipper fasteners, etc., has acquired former plant of L. E. Waterman Co., Newark, N. J., fountain pens, etc., totaling 250,000 sq. ft. of floor space, on six-acre tract, and will improve for plant. Contract has been let to Iorio Construction Co., 22 Orchard Street, Jersey City, N. J., for alterations to cost close to \$50,000. B. Sumner Gruzen, 921 Bergen Avenue, Jersey City, is architect. Part of structure will be occupied by Margon Corp., first noted address, manufacturer of toys.

Merc & Co., Inc., Rahway, N. J., industrial and other chemicals, has filed plans for one-story addition, 100 x 175 ft. Cost over \$85,000 with equipment. Carl G. Moll, 549 Gorgas Lane, Philadelphia, is architect.

Charles E. Hires Co., Inc., 206 South Twenty-fourth Street, Philadelphia, soft drinks, has acquired about 21 acres on Thirty-fourth Street, for new one and multi-story mechanical-bottling plant, with main production division, storage and distributing facilities. Cost over \$150,000 with equipment.

American Chain & Cable Co., Inc., Reading Steel Castings Division, Tulpehocken Street, Reading, Pa., has asked bids on general contract for one-story addition, 60 x 140 ft. Cost over \$60,000 with equipment. Muhlenberg, Yerkes & Muhlenberg, Ganster Building, are architects.

West Pittston Iron Works, Inc., West Pittston, Pa., has leased local plant of Vulcan Iron Works for new plant for production of armor plate for Government. Facilities will be installed for employment of over 400 men.

Heintz Mfg. Co., Front Street and Olney Avenue, Philadelphia, steel automobile bodies, radiators, etc., has let general contract to Beaver Construction Co., 1718 Cherry Street, for two-story and basement addition. Cost about \$75,000 with equipment.

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., castings, hydraulic presses, etc., plans one-story additions for expansion in steel castings finishing division for Navy Department. Cost about \$600,000, with appropriation in that amount to be secured from Government.

United States Engineer Office, New Post Office Building, Pittsburgh, asks bids until

Feb. 24 for one three-ton, hand-operated traveling crane (Circular 392), one service water supply pump and tank (Circular 393).

Penn Electrical Co., Irwin, Pa., switchboards and kindred electrical equipment, plans new two-story plant at West Irwin. Cost over \$60,000 with machinery.

General Purchasing Officer, Panama Canal, Washington, asks bids until Feb. 17 for tender brake shoes for 33-in. cast iron wheels, 9200 cans in 5-gal., 1/2-gal., and quart capacities (Schedule 4790).

Potomac Electric Power Co., Tenth and E Streets, N. W., Washington, is arranging fund of about \$10,000,000 for expansion and improvements in steam-electric power stations, transmission and distributing lines, power substations and other structures.

Pepsi-Cola Bottling Co., 1101 East Twenty-fifth Street, Baltimore, has asked bids on general contract for new one-story mechanical-bottling, storage and distributing plant on North Broadway. Cost over \$100,000 with machinery. A. C. Radziszewski, 20 East Lexington Street, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 18 for anchor chain and detachable links for Sewall's Point, Va., Mare Island, and Eastern and Western yards (Schedule 5177).

Bryant Chucking Grinder Co., 257 Clinton Street, Springfield, Vt., contemplates one-story plant addition, to cost about \$50,000 without equipment.

Bethlehem Steel Co., Bethlehem, Pa., has plans by Lockwood Greene Engineers, Inc., 10 Rockefeller Plaza, New York, for shipway and pier at its shipbuilding division, Mariners Harbor, Staten Island, N. Y.

Union Carbide Co., 137 Forty-seventh Street, Niagara Falls, N. Y., has approved plans for one-story addition, 76 x 460 ft., for expansion in acid processing division. Cost close to \$100,000 with machinery.

Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, is arranging fund of about \$8,650,000 for expansion and improvements in properties, comprising power plants, transmission and distributing lines, power substations and other structures. Work will include new generating station at Riverside, with initial installation of turbine-generator unit of 67,000-hp. rating, high-pressure boilers and auxiliary equipment, scheduled for completion in 1942.

The South

• **Reynolds Corp.**, Southern Building, Washington, subsidiary of Reynolds Metals Co., Federal Reserve Bank Building, Richmond, Va., has let general contract to V. P. Loftis, Builders' Building, Charlotte, N. C., for new fuse-loading plant near Macon, Ga., for production for Government. Cost about \$1,000,000 with equipment.

Iron Mountain Baking Co., Monroe, La., has approved plans for new one-story plant, 75 x 145 ft. Cost over \$65,000 with traveling ovens, mixing machinery, conveyors and other equipment. J. W. Smith & Associates, Monroe, are architects.

Tubize Chatillon Corp., 2 Park Avenue, New York, viscose rayon products, plans expansion and improvements in mills at Rome, Ga., and Hopewell, Va., comprising one-story buildings and installation of equipment. Company is arranging financing in gross amount of \$4,500,000, considerable part of proceeds to be used for purpose noted.

United States Engineer Office, Charleston, S. C., asks bids until Feb. 18 for heavy-duty

NORTH AMERICAN

EQUIPMENT FOR

COMBUSTION



NORTH AMERICAN

MANUFACTURING CO., CLEVELAND, O.

valve seat grinder and accessories (Circular 44).

Alabama Dry Dock & Shipbuilding Co., Mobile, Ala., plans expansion in shipyard for construction of cargo vessels for Government, including four new shipways, iron and metal-working shops, and auxiliary structures. Cost close to \$2,000,000 with equipment.

Fayette County Board of Education, Courthouse, Lexington, Ky., D. Y. Dunn, County school superintendent, has approved plans for one-story vocational building at Lafayette School, to include machine shop, tool room, sheet-metal and other departments. Cost close to \$100,000 with equipment. John T. Gillig, Short Street, near Esplanade Avenue, is architect.

Florida Power & Light Co., Miami, Fla., plans expansion in steam-electric generating station at Miami Beach, including two multi-story additions and installation of new 30,000-kw. turbine-generating unit, surface-type steam condensers, high-pressure boilers, economizers, traveling water screens, water-treatment equipment, evaporators and accessories; also, two 6000-gal. fuel oil storage tanks. Cost about \$2,500,000. Ebasco Services, Inc., 2 Rector Street, New York, is consulting engineer.

Board of Education, Nashville, Tenn., B. O. Euggan, commissioner, plans one-story vocational shop at local Tennessee Industrial School. Cost about \$150,000 with equipment.

Central States

● **St. Marys Mfg. Co.**, St. Marys, Ohio, rubber products, a subsidiary of Goodyear Tire & Rubber Co., Akron, Ohio, has asked bids on general contract for two additions, one and two-story, 50 x 530 ft., and two-story, 80 x 250 ft., respectively. Cost over \$250,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, has let general contract to Rust Engineering Co., Clark Building, Pittsburgh, for Naval ordnance plant at Canton, Ohio. Cost estimated at \$16,000,000 with equipment. Plant will be operated for Government by Westinghouse Electric & Mfg. Co., East Pittsburgh.

Trumbull Electric Mfg. Co., Plainville, Conn., electric switches, starters, panelboards, etc., has purchased buildings at Section Avenue and line of Baltimore & Ohio Railroad, Norwood, Cincinnati, for new branch plant to be operated in conjunction with branch works at Ludlow, Ky. Cost over \$150,000 with equipment. Potter, Tyler & Martin, 35 East Seventh Street, Cincinnati, are architects.

Cleveland Graphite Bronze Co., 880 East Seventy-second Street, Cleveland, bearings, bushings, etc., plans several one-story additions for increase in output of aircraft bearings and parts. Cost about \$2,000,000 with equipment. Company is arranging financing through sale of preferred stock totaling \$3,000,000, cost to be secured from this fund.

North Electric Mfg. Co., Galion, Ohio, automatic telephones and systems, parts, etc., will begin superstructure soon for two one-story additions, for which general contract has been let to Simon Small & Sons, Inc., Mansfield, Ohio. Cost over \$85,000 with equipment. Garfield, Harris, Robinson & Schafer, National City Bank Building, Cleveland, are architects.

Light Metals Corp., 2440 Yandes Street, Indianapolis, metal products, plans one-story addition, 50 x 140 ft. Cost close to \$50,000 with equipment. Calvin R. Clauer, 398 Division Street, is engineer.

Chrysler Motor Parts Corp., Funston and Chrysler Roads, Kansas City, Kan., will begin superstructure at once for one-story addition, about 87,500 sq. ft. of floor space, to be occupied under lease from Kansas City Industrial Land Co., Railway Exchange Building, which has let general contract to Weeks Construction Co., Finance Building, Kansas City, Mo. Cost over \$200,000 with equipment. Charles E. Keyser, 609 Minnesota Avenue, is architect.

Wagner Electric Corp., 6400 Plymouth Avenue, St. Louis, has let general contract to Hercules Construction Co., 8808 Ladue Road, Ladue Village, near St. Louis, for two addi-

tions, three stories, 70 x 300 ft., and one-story, 95 x 120 ft. Cost over \$200,000 with equipment.

Stanolind Oil & Gas Co., Tulsa, Okla., subsidiary of Standard Oil Co. of Indiana, Inc., 910 South Michigan Avenue, Chicago, plans new gas recycling plant in South Jennings oil field, Jefferson Davis Parish, La., for natural gasoline production, with compressor station, boiler house, steel tank storage division, pumping station and other facilities. Cost close to \$450,000 with equipment.

City Council, Stafford, Kan., plans expansion and improvements in municipal power plant, including new 540-hp. diesel engine-generator unit and auxiliary equipment. Cost about \$60,000. Paulette & Wilson, 1006 Kansas Avenue, Topeka, Kan., are consulting engineers.

Chicago Bridge & Iron Co., 918 Richmond Avenue, Houston, Tex., steel tanks, towers, etc., has let general contract to E. Lee Bond, 805 Blodgett Street, for new one-story plant, 60 x 160 ft., with three adjoining structures, on Clinton Drive, for new factory branch, storage and distributing plant. One-story office building also will be built. Cost close to \$70,000 with equipment. Main offices and plant are at Chicago.

City Council, Sonora, Tex., has plans for new municipal power plant. Proposed to use diesel engine-generator units and accessories. Bond issue of \$175,000 has been authorized for project. Albert C. Moore & Co., Smith-Young Tower Building, San Antonio, Tex., are consulting engineers.

Briggs Mfg. Co., 11631 Mack Avenue, Detroit, automobile bodies, etc., has awarded general contract to W. E. Wood Co., 4649 Humboldt Street, for one-story addition to plant on Connors Avenue. Cost over \$60,000 with equipment.

Brunswick-Balke-Collender Co., 629 South Wabash Avenue, Chicago, billiard tables, bowling alleys, etc., has let general contract to Strom Construction Co., Grand Rapids, Mich., for one-story addition, 240 x 260 ft., to branch plant at Muskegon, Mich. Cost close to \$175,000 with equipment. Emil Zillmar, Grand Rapids, is architect.

Metal Parts, Tool & Die Co., Grinnel Avenue, Detroit, care of Henry Kohner, Inc., Murphy Building, architects, organized to manufacture tools, dies and kindred products, has let general contract to Stibbard Construction Co., 3000 Grand River Avenue, for one-story plant. Cost close to \$50,000 with equipment.

Aircraft Parts Production Corp., Ann Arbor, Mich., recently organized by officials of Buhr Machine Tool Co., same place, as an affiliated interest, plans new factory for manufacture of under-carriage parts and kindred mechanical equipment. Initial facilities will provide for working force of about 100 persons. Cost over \$65,000 with equipment. Joseph F. Buhr, president of parent company, heads new organization.

Square Tool & Die Mfg. Co., 3327 East Vernor Street, Detroit, has let general contract to Stibbard Construction Co., 3000 Grand River Avenue, for new one-story plant on Hoover Road. Cost close to \$60,000 with equipment. Walter A. Bernardi, 932 Burlingame Street, is architect.

McGraw Electric Co., Toastmaster Products Division, St. Charles Street, Elgin, Ill., electric household appliances and devices, will take bids soon on general contract for two additions, one-story, 100 x 250 ft., and one and two stories, 150 x 230 ft., for expansion in production department, and storage and distribution division, respectively. Cost over \$350,000 with equipment. E. O. Sessions & Co., 120 South LaSalle Street, Chicago, are consulting engineers.

Handy Button Machine Co., 540 North Western Avenue, Chicago, machinery and parts, has asked bids on general contract for new one and two-story plant, 175 x 400 ft., at Rockwell and Twenty-third Streets. Cost over \$300,000 with equipment. A. Epstein, 2001 West Pershing Road, is engineer.

Omaha Steel Works, Inc., South Forty-eighth Street, Omaha, Neb., steel castings, fabricated steel products, etc., plans expansion, with installation of equipment for production of steel products for Government. Cost about \$483,000.

Fund of that amount is being secured through Defense Plant Corp., Washington, Government agency.

Kohler Co., Kohler, Wis., sanitary ware, etc., has asked bids on general contract for five-story and basement addition, 80 x 200 ft., for expansion in brass products division. Cost close to \$250,000 with equipment. Richard Philipp, 756 North Milwaukee Street, Milwaukee, is architect.

LaPlant-Choate Mfg. Co., Inc., 3015 First Avenue, S. E., Cedar Rapids, Iowa, road machinery and parts, has let general contract to Loomis Brothers, 313 Eighth Avenue, S. E., for two one-story additions; one structure will comprise two sections, 30 x 260 ft., and 50 x 180 ft., respectively, for expansion in assembling department; other will be 80 x 220 ft. for parts-manufacturing unit, with storage and distributing division. A traveling crane will be installed in each building. Cost close to \$300,000 with equipment.

Burt Mfg. Co., Akron, Ohio, manufacturer of ventilators, has awarded contract to Austin Co., Cleveland, for an addition to cost \$50,000.

Western States

● **Hughes Aircraft Co.**, Union Air Terminal Burbank, Cal., has let general contract to MacIsaac & Menke, 3445 Union Pacific Avenue, Los Angeles, for new experimental aircraft works on 300-acre tract at Inglewood, Cal., consisting of three one-story and basement structures, all with mezzanine floors, 220 x 300 ft., for assembling; 150 x 240 ft., for processing department and 75 x 150 ft., for machine shop; also a two-story and basement engineering building, 100 x 230 ft. Cost over \$500,000 with equipment. H. L. Gogerty, 1717 North Vine Street, Hollywood, Cal., is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 18 for copper-nickel alloy condenser tubes for Mare Island Navy Yard (Schedule 5181).

Seattle-Tacoma Shipbuilding Co., Tacoma, Wash., plans expansion, including new shipways, dock, several one-story shops and other structures. Cost close to \$2,000,000 with equipment.

Columbia Stamping & Mfg. Co., 2936 South Western Avenue, Los Angeles, stamped metal goods, has let general contract to H. B. Burns, Western Avenue and Ninety-eighth Street, for one-story addition, 85 x 100 ft. Cost close to \$60,000 with equipment. Peter Whitehill, 1522 Sante Fe Avenue, is engineer.

Los Angeles Shipbuilding & Dry Dock Corp., Smith's Island, San Pedro, Los Angeles Harbor, Los Angeles, plans one-story shop addition for expansion in pipe department and mold loft. Cost over \$65,000 with equipment. Holmes & Narver, 639 South Spring Street, are consulting engineers.

Bureau of Yards and Docks, Navy Department, Washington, plans one-story addition to pattern shop, and storage and distributing building at Mare Island, Cal., Navy Yard, to cost \$400,000 with equipment; also new one-story utility and transportation building, cost close to \$100,000 with equipment. Appropriations are being arranged.

Automatic Tension Screen Co., 6225 South St. Andrews Place, Los Angeles, wire screens and kindred metal specialties, will begin superstructure soon for one-story addition, 60 x 115 ft. Cost about \$50,000 with equipment. H. Sage Webster, 717 West 165th Street, Gardena, Cal., is consulting engineer.

Canada

● **Steel Co. of Canada, Ltd.**, Hamilton, Ont., will take bids at once on general contract for one-story addition, 250 x 400 ft. Cost close to \$400,000 with equipment. Hutton & Souter, 36 St. James Street, South, are architects; J. H. Cockburn, 42 St. James Street North, is consulting engineer.

Radiators, B. C., Ltd., 410 Seymour Street, Vancouver, B. C., radiators, cooling equipment, etc., plans one-story addition. Cost close to \$50,000 with equipment.